THE ENGINEERING AND MINING JOURNAL

The Evolution of Tap Jackets and Spouts.

BY HIRAM W. HIXON.*

The first form of tap jacket that I have any recollection of was made of cast iron; cast hollow, of a conical shape, the opening being about 8 in. in diameter at the outer end, with 5 in. of depth through the jacket, the inner end of the hole being 2½ in. in diameter to start with.

These jackets were used in the place of the clay breast on lead furnaces when the more rapid driving of the furnaces made the use of a clay tap too weak and uncertain in action. When the 36-in. round furnace with an 8-ft. smelting column was thought to be about the limit of furnace construction for lead smelting, no tap jacket was necessary. As large an opening as possible was left in place of the lower portion of the breast jacket, to assist in removing the sow and pigs, as some wit remarked.

In the early days of lead smelting in the West all the ores were oxidized and carried enough arsenic to form speiss. This speiss was reduced by the large percentage of fuel necessary to keep the small furnaces running, and in the absence of enough sulphur to make matte which would cut it out, the speiss would settle in the crucible as a sow, displacing the lead.

These sows were the source of much trouble and loss to the smelters. In Leadville in 1880 there were several smelting companies operating in competition, and when the furnaces of any one of them were in trouble through this cause, it was a source of much gossip and amusement to all except the interested parties. It was thought a disgrace to have a furnace frozen up on account of a sow, and it was not an uncommon thing to hold a quiet funeral and bury the sow in the dump as soon as it was removed from the crucible of the furnace. As the mines were worked to a greater depth, sulphides appeared and when used on the charge in sufficient quantity caused the production of matte, which prevented the formation of sows. The enlargement of the furnaces and use of more blast made it necessary to have the tap hole water-jacketed as described above. These same cast-iron tap jackets are still in use on lead furnaces. Copper-smelting furnaces on which a constant discharge is used, call for different appliances, which have been adapted to the different conditions according to the requirements.

The greater portion of copper smelting in Montana was formerly done in reverberatory furnaces. This was due to the fact that the ores were concentrated and the roasted concentrates were not suitable for blast-furnace work. This has been changed to a great extent on account of a change in methods of concentration. In the early days of the Anaconda company, steam stamps were used to crush the ore, all of which was reduced to about 10-mesh size before going to the jigs. This resulted in sliming much of the copper sulphides and caused a heavy loss in concentration. Later improvements in the new plant resulted in coarse crushing and jigging, recrushing tailings and jigging in progressive order of fineness to avoid sliming. The coarse concentrate was smelted with converter slag in blast-furnaces, and the fine concentrate was roasted and smelted in reverberatories.

The furnace spouts used at first were pipe coils made in the shape of a trough, covered on the outside with sheet iron and lined with a mixture of fire-clay and quartz. The discharge from the furnace was under the side or end jacket, through the spout into a settler. The crucible of the furnace was of the same general shape as that of the lead furnace from which it was copied. One end of the spout rested on the crucible and the other on the settler. The flow of the slag and matte stream beneath the furnace jacket soon cut a hole in it, to avoid which the inlet pipe for the spout was run under the jacket, on top of the slag and matte, before connecting with the spout. Later the spout was made of flange steel and bolted to a bronze tap jacket. The discharge end of the spout, being higher than the top of the tap hole, trapped the blast, preventing it from blowing out. Another modification was by casting a pipe coil in cast iron in such shape that the circulation of water through the coil acted as a jacket and prevented the casting being cut out. Copper poured from a converter around a pipe coil gave good results at Teziutlan, Mexico. The trap for the blast was effected by a separate piece of copper, fitting in the cross-section of the spout, provided with a pipe for water circulation. The trap can also be made by putting in a dam of clay and quartz near the end of the spout, and renewing it as often as it is cut out, which is under ordinary conditions every three or four hours. The action of copper-nickel matte on steel is such that it will destroy a jacket that would be serviceable with copper alone.

The spouts introduced by the Canadian Copper Company, which were of flanged steel, as above described, were unserviceable and had to be abandoned. It now uses a water-jacketed box, lined with chrome brick, provided with a bronze overflow. This box is built in front of the discharge from the furnace, and the overflow is higher than the inlet from the furnace. The matte tap from the settler has passed through similar development. Copper blocks with and without water circulation, cast-iron blocks with pipe coils for water circulation, and cast bronze jackets have all been used. Cast-iron blocks without water circulation are in use by the Canadian Copper Company. The hole burns out rather large, and it is necessary to use a conical clay plug (about 6 in. in diameter at the large end) on a stopper handled by two men from behind a shield having a hole through it large enough to pass the plug through. When the ladle is full the two men throw all their weight on the stopper, guiding it into the tap hole, and a third man drives it in with a sledge. If they fail to make a stop a second stopper is provided, and if that fails everybody seeks a safe place until the settler has emptied itself on the floor. I have used copper blocks cast around iron pipe, chrome blocks without water circulation, but have the best results from carbon blocks made for electric smelting electrodes. A 2-in. hole is bored through the block, which is 5 in. thick, and a cast-iron plate with a hole to match is placed on the outside of the carbon block to strengthen it. The matte stream passing through the carbon block does not act on it as rapidly as on cast iron or chrome, and it has the advantage that it does not cause explosions as a water-cooled jacket when it burns out. Copper-nickel matte is much more severe in its action on spouts and jackets than copper matte, and all available material has been tested in the construction of spouts for its conveyance.

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Minerals in Isle of Pines.

According to *United States Consular Report,* No. 2371, September 27, 1905, there is a large amount of different grades of marble, suitable for a great variety of purposes. Both the coarse and fine-grain marbles appear to be remarkably free from cracks, and slabs of any desired dimension can be obtained. The strata are from 3 to 25 ft. in thickness. The coloring is favorable.

Certain portions of the island contain a large amount of disseminated manganese ore. In some places, as at Santa Fe, this manganese has become concentrated, forming deposits of unknown extent, which may some time become valuable.

In the Cerro de la Siguanea, and probably elsewhere on the island, silicious schist, containing veins of brown hematite, is found. Masses of this ore are scattered over the surface in considerable abundance, and while no deposits of iron ore commercially valuable have been discovered, the indications are favorable for the existence of such deposits, especially in the western portion of the island.

A coating for wooden vats is made by heating 80 lb. of tar till all the water is evaporated, and then adding 80 lb. of cement or hydraulic lime, with constant stirring. The mixture should remain thin and fluid. When applied, it is heated and put on hot. It is said to resist acid.

Mine Explosions in Wales.*

Records show that more than 104 explosions have occurred in the South Wales coalfield district, entailing a loss of 4,104 lives. In nine of the explosions, the number of killed exceeded 50, and eight others killed more than 100 each. The following list shows the most serious explosions:

Date.	Mine.	Killed.
1856—July 13	Cymmer	114
1860—December 1	Risca	145
1867—November 8	Ferndale	178
1880—July 15	Risca	119
1890—February 6	Llanerch	176
1892—August 26	Park Slip	110
1894—June 25	Cilfynydd	276
1905—July 11	Wattstown	119

It will be noticed that three of the explosions occurred in the month of July, and that five of them occurred in the summer season. An examination of the entire list shows that the distribution by months has been as follows:

January	13	July	8
February	11	August	11
March	12	September	9
April	3	October	3
May	6	November	8
June	8	December	10

The greatest number of explosions occurred during the extremes of summer or winter, while April and October, the mid-spring and mid-autumn months, have passed with only three explosions each and a comparatively small loss of life. It is significant also that the severest losses of life have occurred in the driest months. These statistics indicate that the mine managers should have practical knowledge of the workings of the barometer and the aquameter. Provision should be made also by Government weather bureaus for supplying daily reports for the guidance of the superintendents of mine ventilation and shot-firing, and these should be posted on the shaft bulletin board.

The explosion that occurred at the United National Colliery at Wattstown, July 11, 1905, cost the lives of 119 men and boys. The percentage of fatalities was possibly the highest on record, for only one man employed in the seam where the explosion occurred was rescued. He owed his life to his rare presence of mind, for when he heard the explosion he poured his tea on his jacket and stuffed it in his mouth to prevent suffocation by the after damp. He was unconscious when found, but the moistened gag had served its purpose, for he recovered quickly after being brought up. The explosion occurred in the lowest seam worked, which is about 450 yd. deep and 9 ft. thick. The longwall system of working is employed, the most modern lamps were in use, and the Schiel type of fans furnished 250,000 cu. ft. of air per minute. The coroner's inquest ended August 2, the unanimous verdict of the jury being as follows:

"The explosion of gas was caused by shot-firing in the barrier of coal between the sinking pit and upcast pit."

The jury also agreed upon the following recommendations:

1. That shot-firing should be absolutely prohibited except between shifts, and only shot-men should be in the pit at the time.

2. That a thorough system of watering roadways, sides and roof should be compulsory.

Notwithstanding these great tragedies, the number of mine fatalities in the United Kingdom is comparatively small. The entire number of persons employed in mining in Great Britain and Ireland during the year 1904 was 877,057, of whom 5,487 were females. The number of fatalities in the same time was 1,055, a decrease of 19 compared with 1903. The rate of fatalities per thousand among the underground workers has been as follows for the last three years: 1902, 1.37; 1903, 1.35; 1904, 1.34.

The rate per thousand among all those employed in mining has been lower, as indicated by the following comparison compiled by the British home office for the year 1902:

United Kingdom	1.24	Holland	1.27
British Empire	1.46	Japan	1.71
Austria	1.60	Russia	2.53
Belgium	1.07	United States	3.26
France	1.09	All foreign countries	2.20
Germany	1.93	Average for the world	1.93

The safeguarding of the lives of miners is engaging the attention of many experts. Following are a number of recommendations:

Improved ventilation, especially at the face of the coal, sufficient to carry off all the gas from ordinary blowers.

Improved lamps to detect the presence of less than 1% of gas.

Watering enough to prevent the accumulation of dust.

Shot-firing between shifts, with only the trained shot-men present.

Rigid inspection of the use of explosives.

Strict enforcement of all mining regulations.

Introduction of cutting machines to reduce the number of men needed per mine.

Observations of the barometer and aquameter daily, and oftener if necessary, especially when shot-firing is to be done.

The furnishing of a room near the shaft head supplied with all the latest appliances for first aid.

The training of a rescue corps at each shaft.

*From U. S. Consular report No. 2374, Sept. 30, 1905.

The Copper Deposits of the Clifton-Morenci District, Arizona.

Since 1890, the progress of the Clifton-Morenci district has been rapid. At present large bodies of low-grade ore are utilized and production has reached high figures. The economic geology of the district has been described by Waldemar Lindgren in professional paper, No. 43, recently published by the United States Geological Survey.

Previous to 1902 there were two strong producers in the district, viz., the Detroit Copper Co. and the Arizona Copper Co. Since 1902 a third, the Shannon Copper Co., has been added. The mines of the Detroit company are located at Morenci, those of the Arizona company at Morenci and Metcalf, and those of the Shannon company at Metcalf. Of the production in 1903 the Arizona company contributed 30,228,000 lb., the Detroit company 16,558,232 lb., and the Shannon company 6,600,000 lb. The total output of the district to the end of 1903 is estimated to be about 201,600 short tons of copper, having a value of approximately $60,500,000.

The ores average 3 or 4% of copper as mined. The monthly output of ore in 1902 was about 60,000 short tons. Of this, 47,000 tons were classed as concentrating ore and 12,000 tons as higher-grade smelting ore, with 6 to 10% copper. The Arizona company smelted the lowest grade of ore, while the Detroit company averaged somewhat higher. The ores of the Shannon company were in 1902 exclusively oxidized ores, containing about 8% copper. Since then this company has also begun the mining of concentrating ore. By far the larger percentage of ore consisted of sulphide ore, containing pyrite and chalcocite. Of oxidized ores, about 13,000 tons a month were mined at Metcalf, and an amount steadily diminishing from 1,500 tons a month at Morenci, making a total of 14,500 tons, or about one-fourth the total production. The output of oxidized ore at Metcalf will continue for a number of years and possibly increase. The oxidized ore mined by the Arizona Copper Co. at Metcalf is the lowest grade utilized in the district, and probably contains on an average less than 3% copper.

Mr. Lindgren believes that the future of the camps is assured for many years, since the low-grade orebodies, which are now the mainstay of the district, are of large extent, and the production bids fair to continue, at least at the present rate, for some time to come.

Gold in Madagascar.

According to *United States Consular Report*, No. 2374, September 30, 1905. there are bright prospects of gold being found in fairly large quantity in Madagascar. The exports in 1903 and 1904 amounted to 4,211 and 5,423 lb., respectively. The gold output of 1905 was 5,521.5 lb., valued at $1,477,500. A large number of persons are prospecting for gold, but most of them are men who have had little experience. Some very rich gravel has been found. Gold-bearing reefs and alluvial deposits have been found in various parts of the island. Some have attracted a great deal of attention.

According to a report by Mr. Ames, secretary of legation at Santiago, Chile, the Chilean and Bolivian governments have, agreeably to a treaty of peace and amity, signed October 25, 1904, entered into a convention under which a railroad is to be built and operated between Arica in Chile and La Paz in Bolivia.

An Interesting Ore Occurrence.

BY GEORGE A. PACKARD.*

The accompanying sketch (Fig. 1) shows the relative location and direction of three tunnels on Coronation island, southeastern Alaska. The distance from No. 1 to No. 2 is 230 ft., and from No. 2 to No. 3 is 247 ft., horizontal measurement. No. 1 is 307 ft., and No. 2 is 165 ft., above No. 3. Tunnel No. 1 is driven in the limestone on the contact with what appears to be a dike of altered diabase which follows a fault plane having an easterly and westerly direction. In this limestone, which from comparison with that studied by Brooks on the neighboring Prince of Wales island I have considered Silurian, occur narrow irregular bodies of galena having a general direction parallel to the dike. These do not occur directly on the contact, but at a distance of 5 to 15 ft. from it in the blue lime of the hanging wall, no ore having been found by any of the several crosscuts

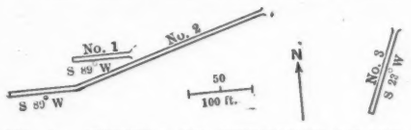

FIG. 1. TUNNELS ON CORONATION ISLAND.

driven through the dike into the light-brown lime on the footwall side. The dike, as it outcrops at the entrance to tunnel No. 1, is shown in the photograph (Fig. 3); the dark spots above the end of the timbers to the right are galena.

No. 2 tunnel was driven to strike this same contact, and similar orebodies were discovered at this depth in the footwall limestone at similar distance from contact.

No. 3 tunnel follows a fault plane nearly at right angles with the preceding work and unaccompanied by any eruptive rock. Close to this line of faulting much of the limestone is soft and more or less altered, containing bunches of galena and other lead-carrying minerals.

Commercially, the most interesting feature of these ore deposits is the fact that while they are not 800 ft. apart, and the ores from both are precisely similar in appearance, a shipment of ore from the upper tunnels to the Tacoma smelter yielded 63% lead and 103 oz. silver per ton, as compared with no values greater than 7 oz. silver accompanying the high lead values from the No. 3 tunnel. A few hundred feet to the north is a prospect hole showing a low-grade ore like that in No. 3, while 600-ft. south, along what appears to be a fault plane from which has resulted a contact with a limestone of different character, is an orebody having high silver values associated with the lead, similar to that shown in tunnels 1 and 2, but containing much zinc.

The discovery of this ore was made by sailors driven into this harbor by a storm, and who, thinking all of the ore as good as the samples they took from the croppings at tunnel No. 1, went to considerable expense, as shown by the photograph of the chute they built, before finding that part of the ore was not of shipping grade.

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FIG. 2. CHUTE BUILT BY SAILORS ON CORONATION ISLAND.

FIG. 3. ENTRANCE TO TUNNEL NO. 1.

Pumice Stone in Russia.

Pumice stone has been found in Russia, within less than 2.5 ft. of the surface in the village of Malaya Kutmâ, about four miles from Kars. The pumice lies in horizontal strata, which are 2.5 ft. thick. It is very porous and fragile, and is found partly in lumps and partly in triturated, earthy heaps, which contain pieces of spongy pumice of various sizes. Owing to its great fragility it is easily crumbled. Pumice is exported from Kars in two varieties, viz., pure, in lumps, and triturated, combined with other foreign matter. The pure pumice, which is valued in proportion to the size of the lumps, is used for polishing metals, lumber, leather, ivory, etc., as well as for preparing a sort of soap, known as "pumice soap." The scattered pumice is used for preparing hydraulic cement. It is planned to export the pumice by rail from Kars to the port of Poti, and thence by ship to Odessa.

Ferro-nickel (3% Ni) is made at Sault Ste. Marie from Sudbury pyrrhotite. Roasted ore is reduced with lime and coke in an electric furnace; 200 h.p. makes a ton of metal per day for $25.20.

Natural and Induced Draught.*

BY JOHN W. COBB.

I find justification for this paper in the somewhat one-sided treatment which, to my mind, has been often given to the subject. One would suppose that there was a consensus of opinion that natural draught, created by a chimney, is of necessity as wasteful as it is certainly antiquated, when compared with artificial draught created by a fan. Let us look dispassionately at the facts.

This is important, because the actual velocities are always considerably below the calculated velocities, owing mainly to frictional resistance and the retarding effect of turns in the flues.

For the normal air temperature of 15° C., the weight of air which a chimney can draw is greatest when the mean temperature of the gases in the chimney is 303° C. Here lies the strength and weakness of the chimney as an air mover. The idea is prevalent that the drawing power of a chimney rises continuously with the internal temperature. The *velocity* of gas entering the chimney can be increased indefinitely by raising the temperature (and the draught-gage will indicate this increase, and so may mislead), but the density of the gas diminishes at the same time, and it is at 303° C. that the *weight* of air drawn is greatest. At this point I would, however, point out that the temperature of 273 or 303° C.[1] is not that of the gas at the chimney foot, which is the temperature easily determined, but is the mean temperature in the chimney. This temperature might be taken as the mean of the temperatures of gas entering and leaving the chimney, but it is not usually convenient to determine the latter.

The calculation as usually made for the loss of heat from any body allows separately for conduction and for radiation and convection losses; the formulas are complicated and not easy to apply to this case, even if applicable. If we make the simple assumption that the circulation of air round a chimney is sufficiently brisk to maintain some temperature, say 40° C. on the outer surface, then the only calculation necessary is for the amount of heat conducted through the walls of the chimney; radiation and convection are simply means of dissipating the heat so conducted, and do not enter into the calculation.

Take the specific case of a brick chimney of 1 m. internal diam. and 0.25 m. thickness of wall, the mean internal temperature being 273° C.; allow a velocity of 5 m. per second for the gases in the chimney (a good working velocity), then the loss would be 1° C. per meter of height. If the chimney were 30 m. high, the loss would be 30° C., and the mean temperature inside being 273°, the temperature of the gas entering would be 290° C., nearly. A simple application will show that the fall of temperature in a chimney may be considerable if it is much too large for its work; to get a good draught in such a case would require a high entering temperature of gas to be maintained at the chimney base.

The general conclusion is that an average chimney-gas temperature of 300° C., or say 320° C. entering the chimney, is an upper limit of temperature which it is vain to exceed with the hope of drawing more air. It is not to be regarded as a working standard, for weights of air drawn diminish very slowly with falling temperatures in the chimney.

I do not propose to discuss the theory of the chimney further; it is difficult to take into account all factors in such a way as to arrive at absolute demonstration, but we have learned that nothing is to be gained by increasing the average temperature beyond 300° C., that good draught can be got out of a chimney without sending into it excessive heat, and that high chimney temperatures are aberrations of practice.

A very low temperature at the chimney foot is sometimes taken as a sign of economical working, but that may not be assumed, since an analysis of the flue gas will often show that the in-leak of air between the furnace and the chimney is the real cause of the lowness of temperature. The temperature and composition of the flue gas should always be taken together if conclusions are going to be drawn.

We have seen to some extent the mode of action of a chimney, which is the only natural-draught producer. Artificial draught is produced in a more obvious manner by the direct suction of a fan, or in the case of what is called "forced draught" by the direct blowing of a fan or other air-compressor. Let us now consider the sort of draught most useful in several types of furnaces.

In a steam boiler, the products of combustion are, immediately after formation, at a temperature very much higher than that of the surrounding metal plates of the boiler; they give up heat quickly to the water through the plates. As they proceed they are cooled, and give up less and less heat to each unit of plate surface. They still contain useful heat on leaving the boiler, and, consequently, are usually passed through an economizer which contains a great many pipes, presenting in total a large surface in order to compensate for the fact that the cooled gases have not nearly the same excess of heat over that of the water to be heated as they had in the boiler. Supposing the installation is a good Lancashire boiler, we may take the products of combustion as leaving the economizer at 150° C., containing 4 to 8% of carbon dioxide.

Is it better now to turn the products of combustion into a chimney, and so produce a natural draught, or to deal with them by a fan? What can we gain by interposing a fan? We might cool the gases further, and for that purpose add more economizer tubes; but we realize that each set of economizer tubes added abstracts less heat from the flue gases, and if the addition is carried too far the first cost and up-keep of the tubes will more than balance the value of heat units saved. The limit to the advantageous adding of tubes is acknowledged by the economizer makers; 400° F. (204° C.) is sometimes given as a temperature of gases leaving boiler, below which it is of no use to add economizer tubes. The makers also rightly insist on the economizer being fed with warm water; the effect of cold water inside the economizer pipes is, of course, to cause condensation from cooled products of combustion on the outside.

Since cooling of the gases below, say, 150 to 200° C., is not to be regarded as an advantage, we may say that if a chimney already exists, and has the drawing power required of it, the fan should not be put in. A calculation can be made which shows that the efficiency of a chimney as an air mover is appallingly low; such a calculation has been published as showing the great advantage of using the much more efficient fan. It is plain that in the case of a chimney using gas at 200° C., and a fan dealing with gas at the same temperature, the chimney is utilizing a very small proportion of the heat, but the fan none at all (for it has to be driven independently); that is the difference between them. Suppose that the chimney does not already exist, then the short light smoke-stack which is sufficient for the fan-discharge offers a considerable saving in cost, even when the price of the fan is considered. Or, suppose that the drawing power is insufficient, that the flue or the chimney is not sufficiently capacious, we can use the full draught of the chimney with economy certainly, but cannot increase it in any reasonable way; the addition of a length to the chimney may be of some use, but such a piece of work is usually done at great disadvantage, and each additional foot does less than its predecessor. Or, suppose that the fuel is of low quality, and will only burn in a fierce draught, or again, that it is desired to increase the output beyond the normal, the full natural draught being already applied. Then we recognize that air can be drawn or forced by the aid of a fan through the fuel and flues at a greater speed than the chimney can give. A damper can be used to secure accurate control just as with a chimney, the power used is very small (say, 1% of the steam raised) and the attendance is almost *nil*. The fan here finds its legitimate function.

Let us compare the natural and forced draught more closely. A boiler is much

*Abstract of a paper in *Journal* Soc. Chem. Ind., May 31, 1905.

[1]273° C. if outside air is at 0° C.; 303° C. if outside air is at 15° C.

more likely to work efficiently if the combustion is effected without a large excess of air. Thus, if the gases leave the economizer at 200° C. containing 8% of carbon dioxide, 15% of the heat of the coal is wasted in them; if they contain 4% of carbon dioxide at the same temperature, the waste is 28%. The best way to diminish the excess of air, while maintaining active combustion, is to work with a thicker fire, but the thicker fire offers more resistance to the passage of air, and to overcome the resistance effectively often means more air-pressure or draught than a chimney can give. In the case of very low-class fuels this high pressure is an absolute necessity if they are to burn at all, and probably it always allows a smaller excess of air to be used. On six Lancashire boilers side by side, working into the same chimney, one with a fan-made air-pressure of 5 cm. water-gauge under the grate and the others with 15 mm. draught on the furnace flues, observations were made as to coal burned per sq. ft. of grate area and composition of flue gas. The advantage in output lay greatly with the forced draught; the coal burned averaged 21 lb. per sq. ft. of grate per hour, as against 15 lb. for the natural draught. In composition of flue gas the differences shown were small so long as the samples at the hand-fired natural-draught boilers were taken while the firing doors were closed. The figures (strictly representative of normal working) varied from 12.8% CO_2, 5.6% O in flue gas of a hand-fired boiler with natural draught to 15.1% CO_2, 3.2% O from a boiler having mechanical stoker and forced draught.

The average amount of free oxygen in many tests was 3% for the forced draught, 4% for the natural draught, indicating about 30 and 40% excess of air used in the two cases. All these samples were taken from the furnace flue at the back of the boiler. I think that the erratic numbers which find their way into conversation and print regarding the amount of carbon dioxide and oxygen in the flue-gases from boilers are often very largely due to sampling at the wrong place. Even with a good new boiler-setting the errors from this cause are considerable, and with an old or bad one are almost inconceivably large. I give examples (Lancashire boiler):

Sample drawn	CO_2 % in Flue Gas	
	a	*b*
Leaving furnace flue	15.2	14.8
At boiler front	8.6	8.4
Leaving side flue	5.9	6.2

If chemical analysis is to be used as a positive means of control in boiler firing, the necessity for caution in this respect is obvious. Samples should be drawn as soon as possible after the completion of combustion, before air has had a chance to leak in and make the sample tell a false tale about the combustion process.

There is a caution to be observed respecting the use of a fan for the sole purpose of enlarging output; the boiler and economizer have a heat-abstracting power which can be increased by apt use up to a certain limited point, a fan used in such manner as to burn more coal on the grate than this limit allows, does so in a wasteful fashion; such waste is pointed out by excessive temperature in the escaping flue gas.

It may be worth noting that since the special usefulness of a fan is to create a high velocity against resistance on the grate, it follows that in a gas-fired boiler, the fan is not called for; in this case there is no bed of fuel and, therefore, the resistance is low, and much larger quantities of gas than of coal can be burned with the same draught. There is here the further reason that whereas the stopping of a fan for a few minutes in itself checks combustion in the coal fire, it only checks the air supply of a gas fire, and large volumes of unburnt gas stream through the flues until the attendant turns off the gas supply; this may be a serious danger, especially at night.

Perhaps the simplest of other types of furnaces is the ordinary reverberatory, of which the iron puddling furnace and coal-fired reheating furnace are examples. The coal burns on a grate, and the products of combustion pass at once into the working part of the furnace, and there heat the iron or other material; they then pass to the chimney. This is the ordinary construction, and since the gases reach the chimney at nearly the working temperature of the furnace, their temperature is obviously too high for a fan. And not entirely because no quick-running machine can withstand the heat and oxidation satisfactorily for any length of time; for even if that difficulty were overcome, the increased volume of the gas resulting from its high temperature would be a hindrance. If the temperature of gas is 819° C., the fan to draw them must have twice the capacity; if 1,365° C., three times the capacity, which would be necessary for the same gases at 273° C. A pressure-fan delivering air under the grate would be more applicable, and a steam jet blower is sometimes used. The furnace may be arranged so that the products of combustion are utilized in a boiler on their way to the chimney. This is a very efficient arrangement if well-designed, because the steam boiler is so efficient a heat abstractor and the steam is nearly always wanted at hand. The conditions in general governing choice of draught become in this case those of boiler-firing previously discussed.

The furnace or kiln ordinarily used for the firing of bricks and pottery is really a reverberatory furnace, in which the volume of the goods to be heated is very large in relation to the grate area. Consequently, until the temperature inside the kiln becomes high, the products of combustion are cooled by giving up heat to the goods, and the flue-gases are cool; when the higher temperatures are reached inside the kiln the hot goods have very little heat-absorbing power, and so the flue-gases escape hot. Here we have a peculiar case in which the products of combustion increase continually in temperature and volume as the firing progresses; it is much better suited for a chimney than a fan.

As regards regenerative gas-furnaces, with the ordinary construction, the gases leave with enough heat in them, 200 to 400° C., to work a chimney well, and the remarks applied to the gas-fired boiler are applicable, but to a less extent.

Electrolytic Determination of Zinc.

K. Jene, in *Chem. Zeit.*, 1905, XXIX, 803-804, describes an adaptation of the method devised by v. Foregger-Greiffenturn, wherein 0.5 grm. of the substance is dissolved in aqua regia, the solution evaporated to dryness, 1 to 2 c.c. of 1:1 sulphuric acid added, and the mixture evaporated till white fumes appear. After cooling, the solution is diluted with water, heated to boiling, and the lead and insoluble matter filtered off. It is possible, with practice, to keep the bulk of filtrate and washings down to 100 c.c. Four to seven grams of solid sodium hydroxide are then added, and allowed to dissolve completely, the solution is heated to 50° C., and poured into a coppered platinum, or a nickel, basin for electrolysis.

The temperature is kept at about 50° C, by a small burner, and the solution is electrolyzed for 1½ to 2 hours, with a current of 1 ampère at 3.8 to 4.2 volts. The end is shown by hanging a small copper strip in the liquid in contact with the basin for some minutes, when no zinc should be deposited on it. The deposit is first washed without interrupting the current, then with water and acid-free alcohol, dried in the air-bath for a couple of minutes, and left in the desiccator for weighing. It may be advantageous to add from time to time a few drops of water to allow for evaporation, and thus avoid exposure of the upper edge of the zinc deposit. The deposit can be removed by very dilute nitric acid without affecting the copper.

Duplicate assays agree very closely, and the maximum difference between this method and the gravimetric (weighing as sulphide in Rose crucible), in a large number of ores containing from 12 to 35% of zinc was 0.3%. Direct experiment, in which compounds of iron, aluminum and manganese were added to pure zinc sulphate, showed that the precipitated hydroxides do not interfere with the electrolysis.

The Culebra Cut.

The illustrations which we are enabled to present herewith, through the courtesy of W. D. Waltman, Supervisor of Mining in the Panama Canal Zone, show views of work done on the Culebra cut since the American régime began.

Fig. 1 is a general view looking south through the main cut. The steam appearing at the left on the upper bench is from a 70-ton Bucyrus steam shovel, shown to better advantage in Fig. 4. In the foreground of the first figure is seen a bucket excavator (of the French type, a relic of the elder day) which is now being dismantled. To the left of the latter is shown another relic, a train of empties of French make coupled to a Belgian engine; and in the middle distance, under the cross as marked, is the spot where the blast illustrated in Fig. 3 was exploded. The peak shown in the distance is one forming the east side of the lock at Paraiso. The cut is to be deepened for a sea-level canal 180 ft. below the lowest portion shown in Fig. 1.

The steam shovel (Fig. 4) is working against the 150-ft. rock-face on "Contractor's hill" on the west side of the main cut. The laborers near the top of the cliff are mostly drill men and their helpers, suspended by ropes or working from stagings, breaking a way for benches upon which to instal steam drills. The men are negroes from Jamaica and Barbadoes; they are very inefficient, but are paid from 20c. to 32c. (silver) per hour. A nearer view of the same gang of men is shown in Fig. 2. The holes drilled are 1½ in.

FIG. 1. GENERAL VIEW OF CULEBRA CUT, LOOKING SOUTH. THE CROSS INDICATES THE POSITION OF THE BLAST SHOWN IN FIG. 3.

FIG. 2. DRILL MEN AND HELPERS.

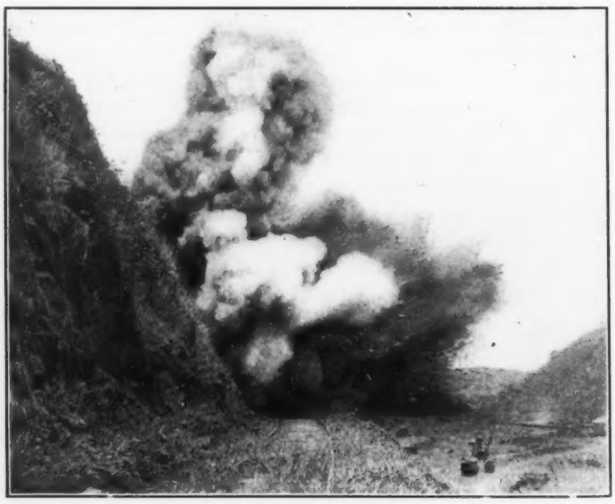


FIG. 3. 1,800-POUND DYNAMITE BLAST.

diameter at the bottom, and from 18 to 24 ft. deep. The rock upon which this gang is engaged is a hard grayish-black basalt, which is very difficult to drill, and hard to break in blasting. The blast illustrated (Fig. 3) is on the east side of the cut, this particular charge being fired with 1,800 lb. of 60% dynamite.

The actual work of construction has been considerably curtailed, preparatory to the completion of the sanitation work now being taken up. It is not likely that any extensive expansion in operations will take place before the beginning of the dry season in December.

FIG. 4. ROCK FACE AND STEAM SHOVEL ON CONTRACTORS HILL.

New Coal Mines in England.

According to Consul Mahin, of Nottingham (in *Daily Consular Report,* No. 2363, Sept. 18, 1905), recent discoveries in Nottingham have added materially to the known quantity of coal underlying British soil. Experimental sinking operations have added another colliery to the large number now being worked in that county. The new deposit, reached at a depth of 544 yards, now employs 240 men and is expected to yield 4,000 tons a day. In the nearby county of Stafford, after several years of expensive and apparently useless prospecting, a bed has been discovered and is now being developed which, it is calculated, will yield about 4,000,000 tons of good coal. There are indications that a valuable field of ironstone lies at a greater depth than the coal seam.

Determination of Platinum and Iridium.

L. Quennessen, in *Chem. News,* 1905, XC, 29-30, describes a method for the determination of platinum in alloys containing iridium, wherein the substance is dissolved in a mixture of 1 vol. of nitric acid of sp. gr. 1.32 and 2 vol. of hydrochloric acid of sp. gr. 1.18. After carefully expelling the excess of nitric acid, the solution is heated to 120° C., water is added, and the metals precipitated by magnesium. The deposited metals are dried, ignited and heated to dull redness in a current of hydrogen.

Aftear cooling, the excess of magnesium is removed by extraction with sulphuric acid (1 in 10) and the residue treated with aqua regia diluted with three times its volume of water. The solution contains platinum but no iridium; the platinum is precipitated as the double ammonium chloride, and the precipitate ignited, preferably in the presence of a reducing agent, such as the charred filter paper.

The iridium precipitated by magnesium is soluble in dilute sulphuric and acetic acids, and is probably in the form of an oxide. The precipitate while still moist, or after drying at 100° C., gives a yellow solution gradually changing to violet with dilute sulphuric acid, and a green solution with acetic acid. After being heated in air at 440° C., it dissolves in sulphuric acid with a violet color, and after heating at 800° C., it gives a blue solution.

Method of Coal-Mine Sampling.

M. R. Campbell, in *Bulletin* No. 5 of the American Institute Mining Engineers, Sept., 1905, p. 1064, recommends the following method for sampling coal seams to determine the chemical composition and calorific value of the coal.

1. Select a fresh face of coal, and clean it of all powder-stains and other impurities.

2. Cut a channel perpendicularly across the face of the coal from roof to floor with the exceptions noted in 3, of such a size as to yield at least 5 lb. of coal per foot of thickness of coal bed; that is, 5 lb. for a bed 1 ft. thick, 10 lb. for a bed 2 ft. thick, 20 lb. for a bed 4 ft. thick, etc.

3. All material encountered in such a cut should be included in the sample, except partings or binders of more than 0.25 in. in thickness, and except all lenses or concretions of sulphur or other impurities greater than 2 in. in maximum diameter and 0.5 in. in thickness.

4. The sample may be sent to the laboratory as it is cut, or it may at once be quartered down to about the size of a quart. If it is quartered down it should be pulverized to about ⅜-in., and after thorough mixing it should be divided into quarters and opposite quarters rejected. The operation of mixing and quartering should be repeated until the desired size of sample is obtained. The operation of pulverizing and quartering should be done as rapidly as possible, so as to prevent a serious change in the moisture-content, and then the sample should be sealed in either a glass jar or screw-top can, bound with tire-tape, and sent to the laboratory for analysis.

5. The analysis of such a sample will show the grade of coal that may be obtained by careful mining and picking. In the majority of cases the sulphur and ash in the commercial output of the mine will exceed the amount obtained from the sample, but this can be approximated by multiplying by certain coefficients. The coefficients determined in the work of the Geological Survey coal-testing plant last year will not be strictly applicable, since the sampling was not done under this system, but they are approximately the same and can be used until more accurate coefficients are determined. When sufficient data are at hand it seems possible that specific coefficients may be determined for certain fields, that is, a coefficient for the Appalachian field, another coefficient for the Eastern Interior field, etc., and, finally, coefficients may be determined for local subdivisions of the larger fields, or for certain beds of coal within those fields.

The modern steam-turbine is antedated by the engine of Hero, and, in more modern times, by that of Branca, an Italian architect, who lived in the seventeenth century.

The Huntington-Heberlein Process From the Hygienic Standpoint.*

BY A. BIERNBAUM.†

With regard to the hygienic improvements which the Huntington-Heberlein process offers, we must first deal with the questions: What were the sources of danger in the old process, and in what way these are now diminished or eliminated? The only danger which enters into consideration is lead-poisoning, other influences detrimental to health being the same in one process as the other.

With the reverberatory-smelting and roasting-sintering furnaces, the chief danger of lead poisoning lies in the metallic vapor evolved during the withdrawal of the roasted charge from the furnace. It is true that appliances may be provided, by which these vapors are drawn off or led back into the furnace during this operation; but, even working with utmost care, it is impossible to insure the complete elimination of lead fumes, especially in wheeling away the pots filled with the red-hot sintered product. Moreover, the work at the reverberatory-smelting and roasting-sintering furnaces involves great physical exertion, wherefore the respiratory organs of the workmen are stimulated to full activity, while the exposure to the intense heat causes the men to perspire freely. Hence, as has been established medically, the absorption of the poisonous metallic compounds (which are partially soluble in the perspiration) into the system is favored both by inhalation of the lead vapor and by its penetration into the pores of the skin, opened by the perspiration.

A further danger of lead poisoning was occasioned by the frequently recurring work of clearing out the dust flues. The smoke from the reverberatory-smelting furnace especially contained oxidized lead compounds, which on absorption into the human body might readily be dissolved by the acids of the stomach, and thus endanger the workmen.

In the Huntington-Heberlein furnaces, on the other hand, although the charge is raked forward and turned over by hand, it is not withdrawn, as in the old furnaces, by an opening situated right next to the fire, but is emptied at a point opposite into the converters which are placed in front of the furnace. Moreover, the converters are filled with the charge at a much lower temperature. Inasmuch as this charge has already cooled down considerably, there can be practically no volatilization of lead. The small quantity of gas, which may nevertheless be evolved, is drawn off by fans through hoods placed above the converters.

A further improvement, from the hygienic point of view, is in the use of the mechanical furnaces, from which the converters can be filled automatically (almost without manual labor, and with absolute exclusion of smoke). The converters are then placed on their stands and blown. This work also is carried out under hoods, as gas tight as possible, furnished with a few closable working-apertures. During the blowing of the material, the work of the attendant consists solely in keeping up the charge by adding more cold material and filling any holes that may be formed. It does not entail nearly as much physical strain as the handling of the heavy iron tools and the continued exposure of the workmen, to the hottest part of the furnace, which the former roasting process involved.

Some experiments carried out with larger converters (of 4- and 10-ton capacity) have indicated the direction in which the advantages mentioned above may probably be developed to such a point, that the danger of lead poisoning need hardly enter into consideration. Both the charging of the revolving-hearth furnaces and the filling of the converters are to be effected mechanically. Furthermore, in the case of the large converters the filling up of holes becomes unnecessary, and no manual work of any kind is required during the whole time of blowing. The converters can be so perfectly enclosed in hoods, that the escape of gases into the working rooms becomes impossible, and lead poisoning of the men can occur only under quite abnormal circumstances.

The beneficial influence on the health of the workmen attending on the roasting furnaces occasioned by the introduction of the Huntington-Heberlein process, can be seen from the statistics of sickness from lead poisoning for the years 1902 to 1904, as given herewith:

Method of working	Year	No. of men	Lead poisoning: No. of Cases: Total	Lead poisoning: No. of Cases: Per 100 persons	Lead poisoning: Days of sickness: Total	Lead poisoning: Days of sickness: Per 100 persons	Cases contracted: At rever. and sint. fur.	Cases contracted: At H.H. fur.
Old.....	1902	93	15	16.1	246	264.5	11	4
	1903	86	12	13.9	222	258.1	7	5
H.-H.....	1904	87	8	9.2	242	278.2	6	2

This shows a gratifying decrease in the number of cases, namely, from 16.1 to 9.2%; this decrease would have been still greater if Huntington-Heberlein furnaces had been in use exclusively. However, most of the time two or three sintering furnaces were fired for working up by-products, 16 to 18 men being engaged on that work. The Huntington-Heberlein furnaces alone (at which in the year 1904, 69 men in all were occupied) show only 2.9% of cases. That the number of days of illness was not reduced, is due to the fact that the cases among the gang of men working at the sintering furnaces were mostly of long standing and took some time to cure.

The noxious effects upon the health of the workmen in running the shaft furnaces are due to the fumes from the products made in this operation, such as work-lead, matte and slag, which flow out of the furnace at a temperature far above their melting points. Even with the old method of running the shaft furnaces the endeavor has always been to provide as efficiently as possible against the danger caused by this volatilization, and, wherever feasible, to instal safety appliances to prevent the escape of lead vapors into the work-rooms; but these measures could not be made as thorough as in the case of the Huntington-Heberlein process.

The principal work in running the shaft furnaces, aside from the charging, consists in tapping the slag and pouring out the work-lead. Other unpleasant jobs are the barring down (which in the old process had to be done frequently) and the cleaning out of the furnace after blowing out.

In the old process the slag formed in the furnace flows out continuously through the tap-hole into iron pots placed in front of the spout. A number of such pots are so arranged on a revolving table that as soon as one is filled the next empty can be brought up to the duct; thus the slag first poured in has time to cease fuming and to solidify before it is removed. The vapors arising from the slag as it flows out are conveyed away through hoods. At the same time with the slag, lead matte also issues from the furnace. Now the greater the quantity of lead matte, the more smoke is also produced; and, with the comparatively high proportion of lead matte resulting from the old process, the quantity of smoke was so great, that the ventilating appliances were no longer sufficient to cope with it, thus allowing vapors to escape into the work-room.

The work-lead collects at the back of the furnace in a well, from which it is from time to time ladled into molds placed near by. If the lead is allowed to cool sufficiently in the well, it does not fume much in the ladling out. But when the furnace runs very hot (which sometimes happens), the lead also is hotter and is more inclined to volatilize. In this event the danger of lead poisoning is very great, for the workman has to stand near the lead sump.

A still greater danger attends the work of barring down and cleaning out the furnace. The barring down serves the purpose of loosening the charge in the zone of fusion; at the same time it removes any crusts formed on the sides of the furnace, or obstructions stopping up the tuyeres. With the old furnaces, and their strong tendency to crust, this work had to be undertaken almost every day, the men being compelled to work for

*Translated from the *Zeitschrift für das Berg-Hütten-und Salinenwesen im. Preuss. Staate*, 1905, LIII, ii, pp. 219-230.

†Koeniglichen Hüttendirektor, at Friedrichshütte, Upper Silesia, Prussia.

rather a long time and often very laboriously with the heavy iron tools in the immediate neighborhood of the glowing charge, the front of the furnace being torn open for this purpose. In this operation they were exposed without protection to the metallic vapors issuing from the furnace, inasmuch as the ventilating appliances had to be partially removed during this time, in order to render it at all possible to do the work.

In a similar manner, but only at the time of shutting down a shaft furnace, the cleaning out (that is to say, the withdrawing of no longer fused, but still red-hot, portions of the charge left in the furnace) is carried out. In this process, however, the glowing material brought out could be quenched with cold water to such a point that the evolution of metallic vapors could be largely avoided.

Lastly, the mode of charging of the shaft furnace is also to be regarded as a cause of poisoning, inasmuch as it is impossible to avoid entirely the raising of dust in the repeated act of dumping and turning over the materials for smelting, in preparing the mix, and in subsequently charging the furnace.

By the introduction of the Huntington-Heberlein process, all these disadvantages, both in the roasting operation and in running the shaft furnaces, are in part removed altogether, in part reduced to such a degree that the danger of injury is brought to a minimum.

In furnaces in which the product of the Huntington-Heberlein roast is smelted, the slag is tapped only periodically at considerable intervals; and, as there is less lead matte produced than formerly, the quantity of smoke is never so great that the ventilating fan cannot easily take care of it. There is therefore little chance of any smoke escaping into the working-room.

As the production of work-lead, especially in the case of the large shaft-furnace, is very considerable, so that the lead continually flows out in a big stream into the well, the hand ladling has to be abandoned. Therefore the lead is conducted to a large reservoir standing near the sump, and is there allowed to cool below its volatilizing temperature. As soon as this tank is full, the lead is tapped off and (by the aid of a swinging gutter) is cast into molds ready for this purpose. Both the sump and the reservoir-tank are placed under a fume-hood. The swinging gutter is covered with sheet-iron lids while tapping, so that any lead volatilized is conveyed by the gutter itself to a hood attached to the reservoir; thus the escape of metallic vapors into the working space is avoided as far as possible.

This method of pouring does not entail the same bodily exertion as the ladling of the lead; moreover, as it requires but little time, it gives the workmen frequent opportunity to rest.

But one of the chief advantages of the Huntington-Heberlein process lies in the entire omission of the barring down. If the run of the shaft furnace is conducted with any degree of care, disorders in the working of the furnace do not occur, and one can rely on a perfectly regular course of the smelting process day after day. No formation of any crusts interfering with the operation of the furnace has been recorded during any of the campaigns, which have, in each case, lasted nearly a year.

As regards the cleaning out of the furnace, this cannot be avoided on blowing out the Huntington-Heberlein shaft-furnace; but at most it occurs but once a year, and can be done with less danger to the workmen, owing to the better equipment.

Further, the charge is mixed straight into the furnace (in the case of the large shaft-furnace), thus the repeated turning over of the smelting material, as formerly practiced, becomes unnecessary, and the deleterious influence of the unavoidable formation of dust is much diminished.

The accompanying statistics of sickness due to lead-poisoning in connection with the operation of the shaft furnace (referring to the same period of time as those given above for the roasting furnaces) confirm the above statements.

Year	No. of men	Lead poisoning—shaft furnaces			
		Cases		Days of illness	
		Total	Per 100 persons	Total	Per 100 persons
1902	250	58	23.2	956	382.4
1903	267	59	22.1	1044	391.0
1904	232	24	10.3	530	228.4

If it were possible to make the necessary distinctions in the case of the large shaft-furnace, the diminution in sickness from lead-poisoning would be still more apparent; for, among the furnace attendants proper, there has been no illness; all cases of poisoning have occurred among the men who prepare the charge, who break up the roasted material, and others who are occupied with subsidiary work. Some of these are exposed to illness through their own fault, owing to want of cleanliness, or to neglect of every precautionary measure against lead-poisoning.

Thus far we have dealt only with the advantages and improvements of the Huntington-Heberlein process; we will now, in conclusion, consider also its disadvantages.

The chief drawback of the new process lies in the difficulty of breaking up the blocks of the roasted product from the converters, a labor which, apart from the great expense involved, is also unhealthy for the workmen engaged thereon. Seemingly this evil is still further increased by working with larger charges in the 10-ton converters, as projected; but in this case it is proposed to place the converters in an elevated position, and to cause the blocks to be shattered by their fall from a certain height, so that further breaking up will require but little work. Trials made in this direction have already yielded satisfactory results, and seem to promise that the disadvantage will in time become less important.

Another unpleasant feature is the presence (in the waste gases from the converters) of a higher percentage of sulphur dioxide, the suppression of which, if it is feasible at all, might be fraught with trouble and expense.

That the roaster gases from the reverberatory-smelting and sintering furnaces did not show such a high percentage of sulphur dioxide, must be ascribed chiefly to the circumstance that the roasting was much slower, and that the gases were largely diluted with air already at the point where they are formed, as the work must always be done with the working-doors open. In the Huntington-Heberlein process on the other hand, the aim is to prevent, as far as possible, the access of air from outside while blowing the charge. The more perfectly this is effected, and the greater the quantity of ore to be blown in the converters, the higher will also be the percentage of sulphur dioxide in the waste gases. This circumstance has not only furnished the inducement, but it has rendered it possible to approach the plan of utilizing the sulphur dioxide for the manufacture of sulphuric acid. If this should be done successfully (which, according to the experiments carried out, there is reasonable ground to expect), the present disadvantage might be turned into an advantage. This has the more significance because an essential constituent of the lead-ore—the sulphur—will then no longer, as hitherto, have to be regarded as wholly lost.

The International Acheson Graphite Co., of Niagara Falls, N. Y., with the recent completion of a large extension equipped with the most modern electrical and mechanical appliances and machinery, has doubled the capacity of its plant for making graphite in the electric furnace, and has closed a contract with the Niagara Falls Power Co. for another 1,000 h.p. of electrical energy in addition to the 1,000 h.p. previously used. The present commercial importance of artificial graphite is indicated by the fact that the value of the product in 1904 was $217,790, while all the natural graphite mined in that year in the United States amounted only to $341,372. New York produced natural graphite worth $119,509. Acheson graphite is largely used in the manufacture of metal protective paints, dry batteries, stove polish, packing and as a lubricant. The electrochemical processes also consume a good deal of it.

Stack Painting by Parachute.

An interesting account is published in the *American Miller* (Aug. 1, 1905) of the manner in which a correspondent elevated to the top of a steel stack, and fastened there, a block and fall for use in painting. The stack was not provided with the usual means for doing this, the top being bare and having no pulley or cord attached to it. The correspondent says: "I procured a double and single steel block, 320 ft. of ½-in. rope, 200 ft. of chalk line, 200 ft. of common fish line, ½ yd. of cheesecloth, a stick 1 in. square about 8 ft. long, together with 90 ft. of ⅜-in, rope, which I happened to have. A pail and some wrapping twine completed my outfit.

"Tying one end of the fish line to the handle of the pail, I ran the line loosely into the pail so that it might be rapidly withdrawn without resistance. I tied the other end to four pieces of line about 2 ft. long which had been tied to the corners of the cheesecloth, thus making a parachute. The pail was then placed in the bottom of the stack, and by means of a stick an assistant lifted the parachute above the opening through which the boilers are connected.

"After a few unsuccessful trials the air or gases caught the parachute and took it up through and out of the top of the stack. It was a very windy day and the fires were banked. The parachute was secured, and by means of the chalk line the ½-in. rope was drawn up through the inside and down the outside of the stack. The hook on the double block was replaced by one made of ⅝-in. steel and of suitable size to hook over the band at the top of the stack. The blocks were then threaded up with the other end of the ½-in. rope and pulled about 12 ft. apart.

"The tackle was then bound to the stick and to the ½-in. rope, which was now hanging on the outside of the stack. The old ⅜-in. rope was tied into the hook of the single block and the tackle hoisted by pulling the ½-in. rope down and out through the manhole in the stack. Getting the hook over the stack band required some patience, but was finally accomplished. When secured, a few hard pulls broke the wrapping twine by which the tackle was bound, and the ½-in. rope fell down the inside of the stack, and the stick on the outside. We then pulled down the single block by means of the fall, and attached the bos'n's chair that is ordinarily used for stack-painting."

Old boiler tubes can be utilized for pipe lines by the simple expedient of cleaning them and attaching suitable flanges. When the pressure carried is not over 75 lb. per sq. in. the material is sufficiently strong to answer the purpose.

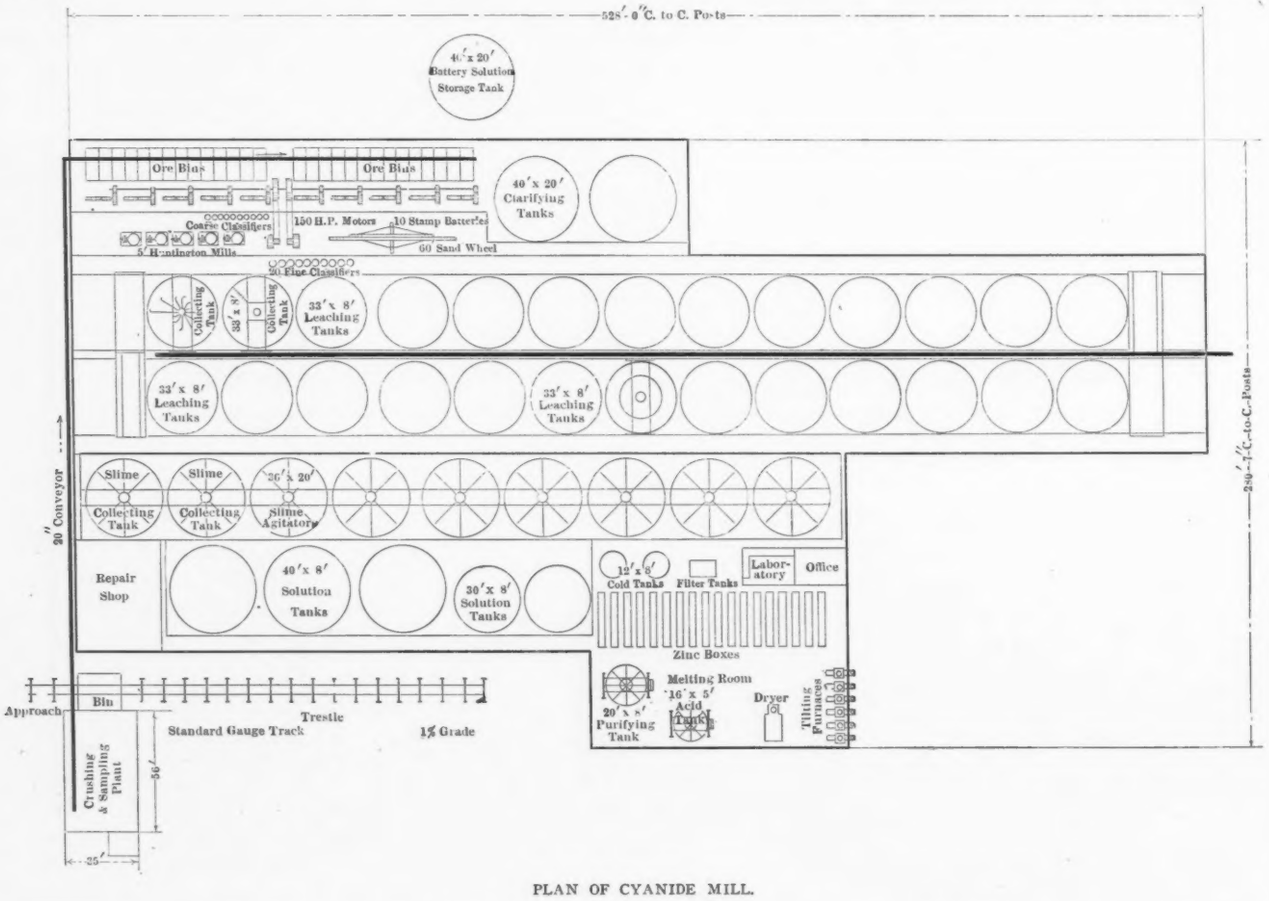
The Tonopah Mining Co.'s Mill.

BY S. A. WORCESTER.*

The general design of this mill is suggested by the outline drawings shown. It is to be located at Goldfield Junction, about 15 miles from the mines; the ore will be delivered to the bin at the crushing and sampling plant in trains of standard-gauge dump cars, the railroad being owned by the Tonopah Mining Co. (which is also erecting a large electric power plant for furnishing current to mines and mills).

Ore from the bin gate falls to the No. 7½ crusher; and, when crushed, it is elevated to the revolving screen with 1¼-in. perforations. All oversize divides in two spouts to the No 4 crushers, which deliver to the same elevator as the No. 7½ crusher. When the material passes the 1¼-in. perforations, it is sampled by the first Vezin sampler, the rejection passing to the mill conveyor, and the sample (about 1-7) passing to the rolls, which reduce it to about ¼ in. This ¼-in. product passes to the second Vezin sampler, which takes a 1-7 sample and sends its rejection also to the mill conveyor (about 350 ft. long), which delivers the ore on the longitudinal conveyor operating over the bins of the 100-stamp mill.

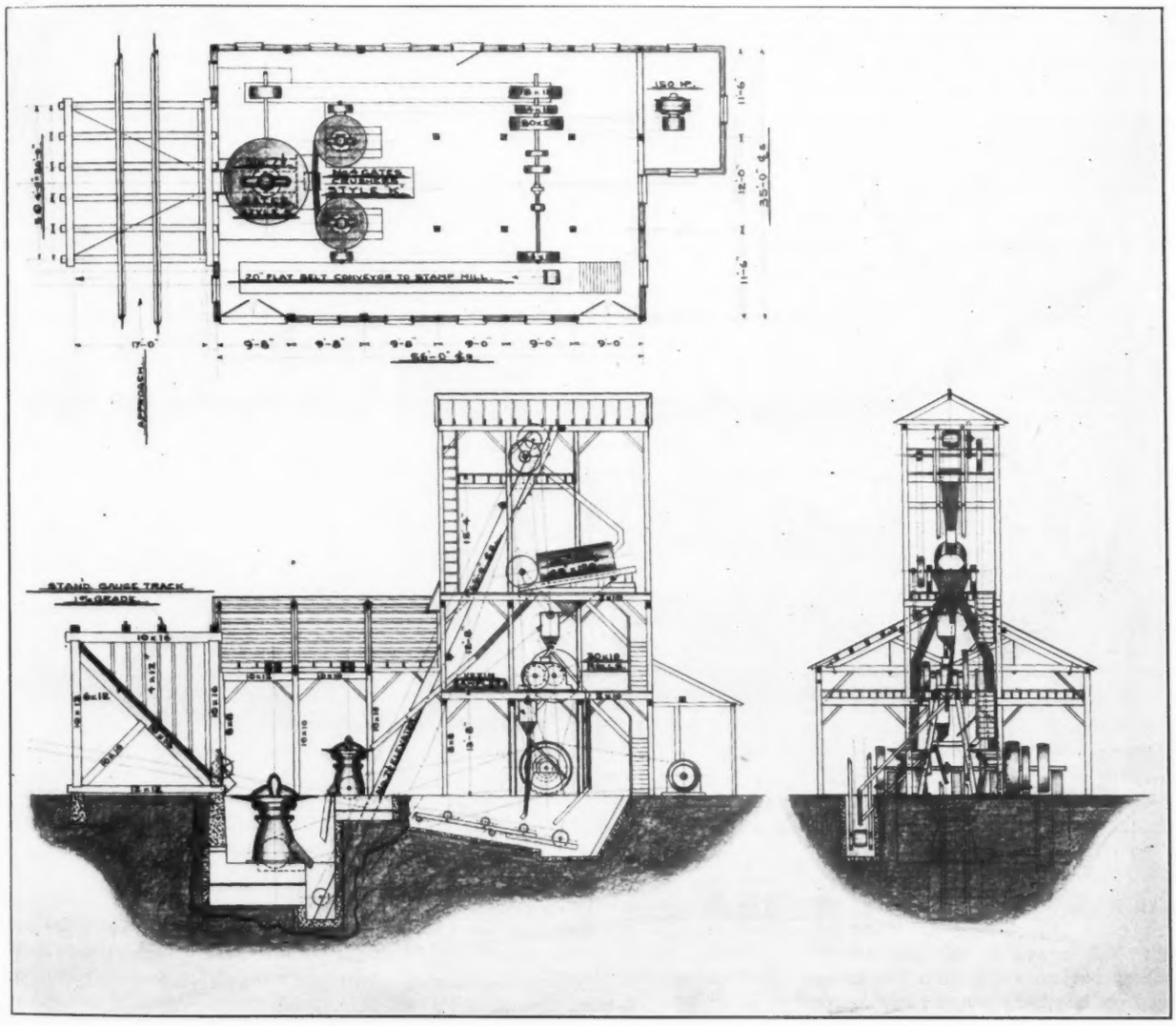
A self-propelling traveling tripper delivers the ore to any bin desired. Bin gates and Challenge feeders deliver the



PLAN OF CYANIDE MILL.

*Mechanical engineer, Victor, Colo.

ore to ten 10-stamp batteries of 1,050-lb. stamps, with apron-front mortars having cast-iron bases and concrete foundations. The batteries are provided with the simple back-knee frame, and are driven in two sections of 50 stamps each by 150-h.p. induction motors located on the main floor. A swinging belt-tightener is used for each 10-stamp battery, and the motor belts, driving with the slack side on top, are tightened by moving the motor on its base. This stamp-mill drive is simple and efficient. Self-oiling bearings are used throughout the plant.



PLAN AND SECTIONS OF SAMPLING MILL.

The pulp from the stamps (which drop 100 times per minute and crush in cyanide solution) passes to 10 coarse classifiers from which the coarser product is re-ground in five 5-ft. Huntington mills, to 50-60 mesh. This pulp then joins the fines from the classifiers and is elevated by the 60-ft. sand-wheel to the 20 fine classifiers arranged in pairs. The coarser sands from the upper 10 are re-classified in the lower ones, and the slime from all goes to the 9 slime vats with agitators, while the sand from the lower cones passes to one or the other of the two sand-collecting tanks (33 by 8 ft.), to which they are delivered by the Butters revolving distributor. Each of these collecting tanks has three slime gates; when filling the tank, the water and slime pass over to a 54-in. Frenier sand pump, and are raised to a fine classifier. This sends its slime to the apropriate tanks and returns any fine sand to the collecting tank.

After draining in the collecting tank, the sand is excavated by an automatic machine and delivered to the central belt-conveyor; this in turn delivers to a centrifugal distributor placed over any desired leaching tank. Both excavator and distributor travel on rails the whole length of the two lines of tanks and can be used over any desired tank. After leaching, excavating and re-distributing a number of times, the sands are finally delivered by the central conveyor to a second conveyor which carries them to a tailing stack at the end of the building. The slimes passing from the fine classifiers are first treated in the two collecting tanks (36 by 20 ft.) which have circular launders around their upper edges. These tanks also have two sets of agitator arms on a vertical shaft, making 5 r. p. m. The nine agitators in the 36 by 20-ft. tanks are driven by a centrally-located 30-h.p. induction motor, through a line shaft running over the center of the tanks; this operates the agitators by bevel-gearing, with a friction-clutch pinion for each agitator.

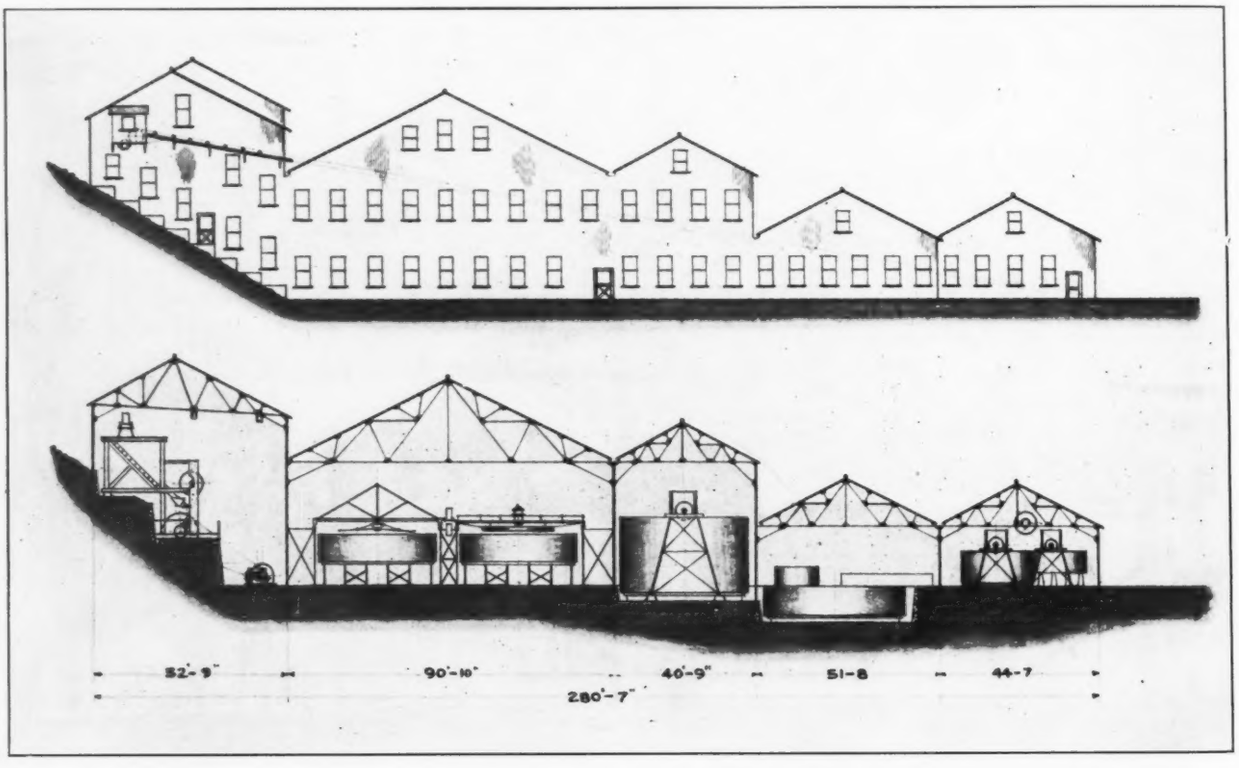
Two 8-in. pipe-lines run over the 9 slime tanks, with valves at each tank; a 10-in. suction line runs below, with a valve connecting to each tank. This suction-line connects to an 8-in. centrifugal pump, driven by a direct-connected 30-h.p. motor on the same base. The pump (discharging into one of the 8-in. lines mentioned) is used for transferring slime from one tank to another. A duplicate "spare" pump is conected to the suction and discharge. The other 8-in. pipe-line is connected to another 8-in. centrifugal pump, drawing solution from any desired one of the three 40 by 8 ft. solution tanks. A swinging decanter of 4-in. pipe is arangerd in each slime tank; this is raised and lowered by a

small winch. These decanters connect to a 4-in. line leading to the gold tanks. An 8-in. pipe-line leads from the slime pump mentioned to the two 40 by 20 ft. clarifying tanks, which have bottom-discharge regulating valves through which the exhausted slime is drawn off to the tailing dump, while the clarified solution is decanted and returned to the gold tanks. A 4-in. centrifugal pump, with individual motor on base, forces the solution from the two 30 by 8ft. tanks to the sand plant through 4-in. lines leading to the 24 leaching tanks. The 8-in. solution pump also forces solution to the 40 by 20 ft. battery storage-tank above the mill.

The 18 zinc boxes each have seven compartments, 3 by 3 ft. by 2 ft. 6 in. inside. The 20 by 8 ft. purifying tank, with agitator, is used in connection with a filter press and triplex pump for purifying solutions. The rectangular filter tank, of steel, is used in connection with a belted vacuum pump for clarifying solutions. A second triplex pump is provided with a main pipe, having a number of short hose lines, for emptying the zinc-boxes. It is also used in connection with the acid tank; agitators in this department are driven from an overhead line shaft, using a 10-h.p. induction motor.

The reverberatory drying furnace (with hearth 6 by 10 ft.), and the six melting furnaces, are to reduce about 50 tons of slime per month. Individual motor drives are used for conveyors, centrifugal pumps, sand pump, sand wheel, excavator and distributor. Three similar motors (each of 150 h.p.) drive the stamp mill and the crushing and sampling plant, the pumps and a large filter press. As there are several motors of each size used, but few spare parts are necessary.

The metallurgical engineering of this plant is in the hands of Godfrey Doveton; the mill is expected to be in operation early in 1906.



END ELEVATION AND SECTION OF CYANIDE MILL.

South American Notes.

BY FRANCIS C. NICHOLAS.

New Gold Discoveries in Colombia.—In the Choco regions of western Colombia there are goldfields where placers have attracted much attention, but owing to the soft bedrock and deeply eroded rivers enterprises have not been successful, though the natives for miles around live by washing gold. Prospecting for the source of the gold has been disappointing, because of the sedimentary formations covering the hills.

It is reported that a company is now operating the Dabaibe mine in the Choco region, which is giving excellent returns with an old stamp-mill, operated under many disadvantages.

Coal in Chile.—Under the direction of the Minister of Industry and Public Works, extended study of the lignite deposits of Chile is being made. These are found in the Tertiary formations along the coast, principally in that portion of Chile in the vicinity and south of Concepcion, but they may be expected in almost any of the lowlands of Chile along the Pacific, the Tertiary formation occupying practically all the land between the ocean and the foothills of the mountains.

The lignite deposits of Chile are being worked at certain places and provide a useful coal for local consumption. It is with the idea of utilizing the coal to the fullest capacity, and at the same time ascertaining the extent to which the country is supplied, that the explorations have been undertaken.

The reports state that lignite deposits are common, but many which on superficial observation look promising are disappointing, being formed largely of black clay.

Chile is believed to possess lignite beds of great importance, which will be a factor in the development and progress of the country. It is established that from many of the deposits coke of excellent quality can be made and that many of the lignites are of such high calorific powers that their analyses would place them among the true coals. The best material is found a little south of Concepcion on Arauco Bay. The mines there are extensive and important, yielding abundant supplies of coal for the cities and towns within reasonable distance. A little below the city of Arauco the Tertiary clays are broken by a formation of igneous rocks, extending from the mountains, but farther down the coast they appear again, and at Curanilahie there are lignite deposits of importance; from there southward almost all the extension is lignite-bearing for 300 miles.

Coal in Argentina.—It is reported that extensive coal deposits are about to be

opened in the Province of Mendoza, almost directly west of Buenos Aires. Explorations have been conducted for some time under the direction of Cristobal H. Hicken. The mines are about 32 miles from Mendoza, in a valley between the Cerro Negro and Jacoli mountains. Outcroppings are exposed across a section five miles broad. The exposures are well defined, and some of them are reported to be 20 ft. thick.

The province of Mendoza comprises the country at the base of the Andes. There is direct railway communication between Mendoza and Buenos Aires over the Great Western & Pacific Railway, the distance being about 600 miles over a generally level country.

Fine Ore in the Iron Blast-Furnace.*

BY F. E. BACHMAN.†

Fine ores do not necessarily give special trouble in the blast-furnace. At present 90% of the mixture used in the Northern Iron Company's furnace is magnetic ore which will pass a 4-mesh sieve. It made over 98% of standard basic iron during the four months ending May 1, 1905, on an average fuel-consumption of 2,241 lb., using 26% of anthracite coal and 74% of mountain coke. For a period of 90 days, it did not make a cast other than standard basic. The furnace is 10 ft. hearth, 17 ft. bosh, and 69 ft. 3 in. high. We are now designing and building a furnace in which we expect to use 100% of magnetic concentrate, passing a 6-mesh sieve, 30% of which will pass a 60-mesh sieve. We do not know whether we will have trouble with this proposition or not, but we do not expect much more than the ordinary irregularities of furnace working.

When using fine ores, especially granular magnetic concentrates, the secret of success seems to be proper distribution. This we think we have attained by the use of a slight modification of Firmstone's modified Langdon charger.

Explosions which have generally been attributed to the use of fine ores are caused not from the fineness of the ore, but by some action of fine hematite-ores. Our furnace has never made a puff of black smoke, and has been in operation for more than two years. The furnace which we are now rebuilding was operated as a charcoal-furnace, using 100% of magnetic concentrates the greater part of the time; although charcoal-furnaces are more likely to have top-explosions than coke-furnaces, it always was free from this class of trouble.

Experiments conducted at the New York navy yard showed that where a steam-jet blower is used for draft, from 8 to 20% of the steam produced was used for operating the jet.

*A communication in *Bulletin* No. 5, Am. Inst. of Min. Eng., Sept., 1905, p. 1151.

†General manager, Northern Iron Co., Port Henry, N. Y.

Fuel Values of Oil and Coal.

Tests on the comparative values of crude oil, fuel oil and slack coal, for evaporating purposes, were made, according to *Ice and Refrigeration*, in the latter part of May and during June at the plant of the Jacob Dold Packing Co., Wichita, Kan. The fuels used in making the tests included crude oil from the wells at Wayside, Kan., fuel oil from the Neodesha, Kan., wells as supplied by the Patty Oil Co., and coal known as East Kansas slack. The boilers used in the tests were all of the return tubular type, 66 inches in diameter and 18 feet long, each boiler containing 54 tubes 4 inches in diameter, and being rated at 145 horsepower capacity per hour. The boilers used for the test with crude oil and fuel oil were equipped with J. Tate & Co.'s burners, while those used in the coal tests were fitted with flat grates. The computations in tabulating the results were based on a total heat of saturated steam at 1188.2° according to Haswell. All the water used in the several tests passed through a meter, so that the amount of water evaporated by the fuel in question could be accurately determined. The tests were made as far as possible under normal conditions and the results are indicated in the appended table. It will be noted that in these tests, as tabulated, one pound of crude oil sufficed to evaporate on an average 11.23 lb. of water. The results are shown in the table given herewith. One pound of fuel oil, starting with a cold boiler and running 121 hours, evaporated an average of 13.72 lb. of water, while the same fuel in a boiler starting at 120 lb. steam and run for 26½ hours evaporated an average of 14.3 lb. of water. With slack coal, boiler starting at 120 lb. steam, the evaporation per pound of coal is 7.366, and with the boiler starting at 85 lb. steam the average is but 6.88. In a test made in Topeka at the plant of the Topeka Cold Storage Co. in June with Weir City slack coal, the average evaporation per pound of coal in 6 hours was given as but 6.23 lb., so that even if the oil cost twice as much per pound as the coal, it would still be more economical and that without considering any other points in favor of the oil fuel.

TABLE OF TESTS ON THE VALUE OF CRUDE OIL AND FUEL OIL AS COMPARED WITH SLACK COAL UNDER BOILERS.

Fuel Used in Test.	Av. Steam. (Lb.)	Av. Feed Water Temp. (°F.)	Average H. P. per Hour.	Duration of Test. (Hr.)	Boilers at Start.	Water Evaporated. (Lb.)	Oil Consumed. (Lb.)	Coal Burned. (Lb.)	Observed Evap. per Lb. Oil. (Lb.)	Observed Evap. per Lb. Coal. (Lb.)	Actual Evap. per Lb. Oil.	Actual Evap. per Lb. Coal.
Test No. 1.—Crude oil (Wayside), weight, 7.57 lb. per gal.; gravity, 24.2...	120	175	142	60.33+	80 lb. steam.	276,227	23,707		11.299		12.142	
Test No. 1.—Fuel oil (Neodesha), weight, 7.66 lb. per gal.; gravity, 22.3..	120.11	175	156	121	Cold.	620,450	45,200		13.7267		14.842	
Test No. 3.—Fuel oil (Neodesha). weight, 7.66 lb. per gal.; gravity, 22.3..	120.11	175	156	94.5	120 lb. steam.	505,500	35296.25		14.321		15.484	
Test No. 4.—Kansas slack coal (two boilers).....	122	156	78	110	(26½ hr.) 120 lb. steam.	54,880		74,500		7.36		8.10315
Test No. 5.—Kansas slack coal (four boilers).....	86 7	179.1	106.437	122	85 lb. steam.	166,248		241,400		6.8865		7.34840

Prussian Mining Law.

Richard Gunther, U. S. consul at Frankfort, Germany, in a recent report, discussed the proposed new mining law for Germany as follows:

The Prussian Government has presented to the legislature a draft of an act to reform the present mining law. This act, if adopted, will remove many of the hardships which caused the great strike of the coal miners in the Rhenish-Westphalian district last January. The owners of the coal mines and the German coal trust, as also the Agrarian party, are bitterly opposed to the new bill; so that it is doubtful whether it will become law. If not passed, the German imperial chancellor will introduce the bill in the Reichstag.

At a convention held last March, at Essen, by the chambers of commerce of the Westphalian and Lower Rhine industrial districts, the proposed reform act was the subject for debate; a declaration was issued that "the governmental bill, if passed, would inflict serious injury upon Germany's industries, especially those that depend upon the export trade, and would also injure the agricultural interests." The convention aserted that the new law would increase the cost of coal, thereby endangering the ability of German manufacturers and coal producers to compete in foreign markets. "One of the serious consequences of the passage of this new mining bill would be the strengthening of the Socialist party. The bill provides for the establishment of a sanitary maximum working day, and of boards of supervision and control to be in part composed of miners."

During the debate on this bill (in the Prussian House of Representatives) Mr. Brust said that the statistics for 1903 show that 70% of all the miners working in the lignite coal mines in that year were taken sick; 67% of those working in the

iron mines of the Sieg district; 60% of the coal miners in the Saar region, and 56% in the anthracite mines of Lower Silesia. That the sanitary condition of the mining industries is deficient and harmful is shown by the examination of conscripts for the army. Mr. Brust confuted the arguments that the restrictions of the bill (in regard to the working time) would diminish production. He pointed to the results at several mines where the 12-hour shift had been reduced to 8 hours. "Nor," he said, "is the allegation of unprofitableness (in case of working-time reduction) true; many of the coal mines at present pay from 30 to 50% dividends on their working capital, others from 10 to 20%." The Prussian minister of commerce, speaking in favor of the bill, remarked that, on principle, he was opposed to fixing a maximum working day because he was unwilling to prevent an adult from earning all he could. But, for sanitary reasons, he considered it right to draw a line.

The new bill limits a day's work to 6 hours when the temperature in the mine exceeds 28° C. (82.4° F.); 7 hours if above 26° (78.8° F.), and 8½ hours if more than 22° (71.6° F.).

W. Borchers, R. Franke and E. Günther, in German patent No. 160,046, Oct. 5, 1904, describe a process in which copper ore used as anode is subjected to a preliminary process of concentration until its percentage of copper is above 72 and as nearly as possible 78 to 80. Only by maintaining the proportion of copper in the ore between these limits does the direct electrolytic manufacture of copper become remunerative. The chief difficulty is the deposition of sulphur at the anode, but by working under the conditions mentioned, with a current-density of about 50 amp. per sq. m. of cathode or anode surface, and with the usual agitation of the electrolyte, it is possible to carry on the process even after the deposition of a thick layer of sulphur on the anode.

A Home-Made Brass Furnace.

A home-made oil-burning brass-melting furnace, which is in use at the works of the Herron Pump and Foundry Co., is described in the *American Machinist* of Aug. 31, 1905, from which we take the illustrations. It is mounted upon trunnions, and by a pilot wheel at one end is turned over to discharge the melted metal into ladles for pouring. The burner enters through the trunnion at the end opposite the pilot wheel and is shown in detail in Fig. 2. Referring to Fig. 1, the left-hand vertical

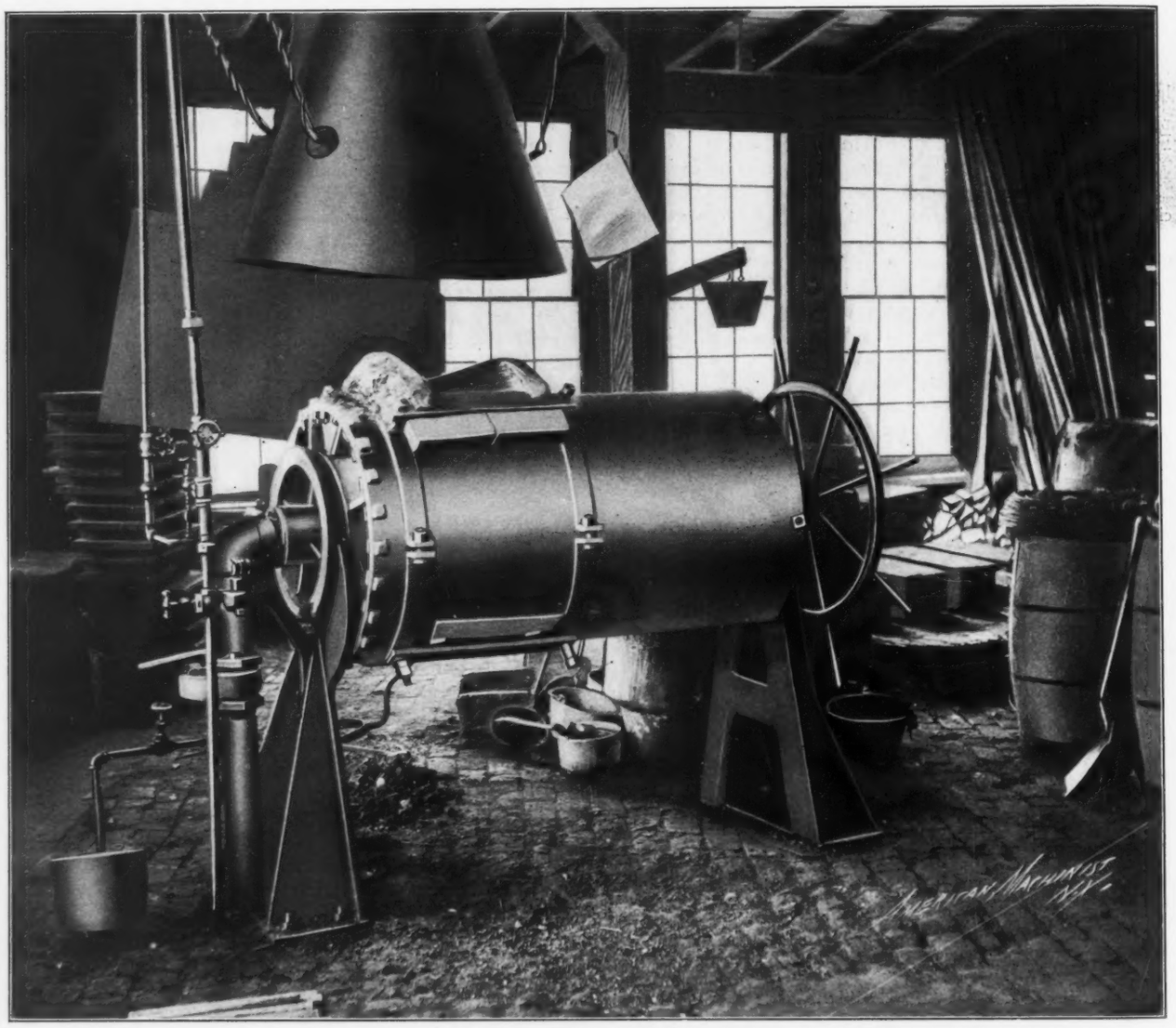


FIG. I. BRASS-MELTING FURNACE AS INSTALLED.

pipe is for steam; and the one near this and just to the right of it is the oil pipe, the two being connected by a small branch and angle valve. The main oil tank is outside the building and at a level below the furnace. The service tank is located above the building and the oil is pumped to it through the vertical pipe shown which will be observed to have valves above and below the burner. Both of these valves being open and the valve in the small branch closed, the service tank

may be filled, when the lower valve is closed and the furnace is ready for action. The small angle valve being opened, the oil flows into the steam-pipe and is blown into the burner through the pipe *a* of Fig. 2, which is forked at the end, each end having a small hole. The air supply is through the blast pipe, shown coming up through the floor in Fig. 1 and fitted with a blast gate. The air blast is under a pressure of from 8 oz. to 1 lb., and enters the burner through the elbow *b*, Fig. 2. On the floor, at the left in Fig. 1, is one of the ladles used for pouring, which is heated to a proper temperature by a charcoal fire within it, this fire being blown by a branch from the air-blast pipe.

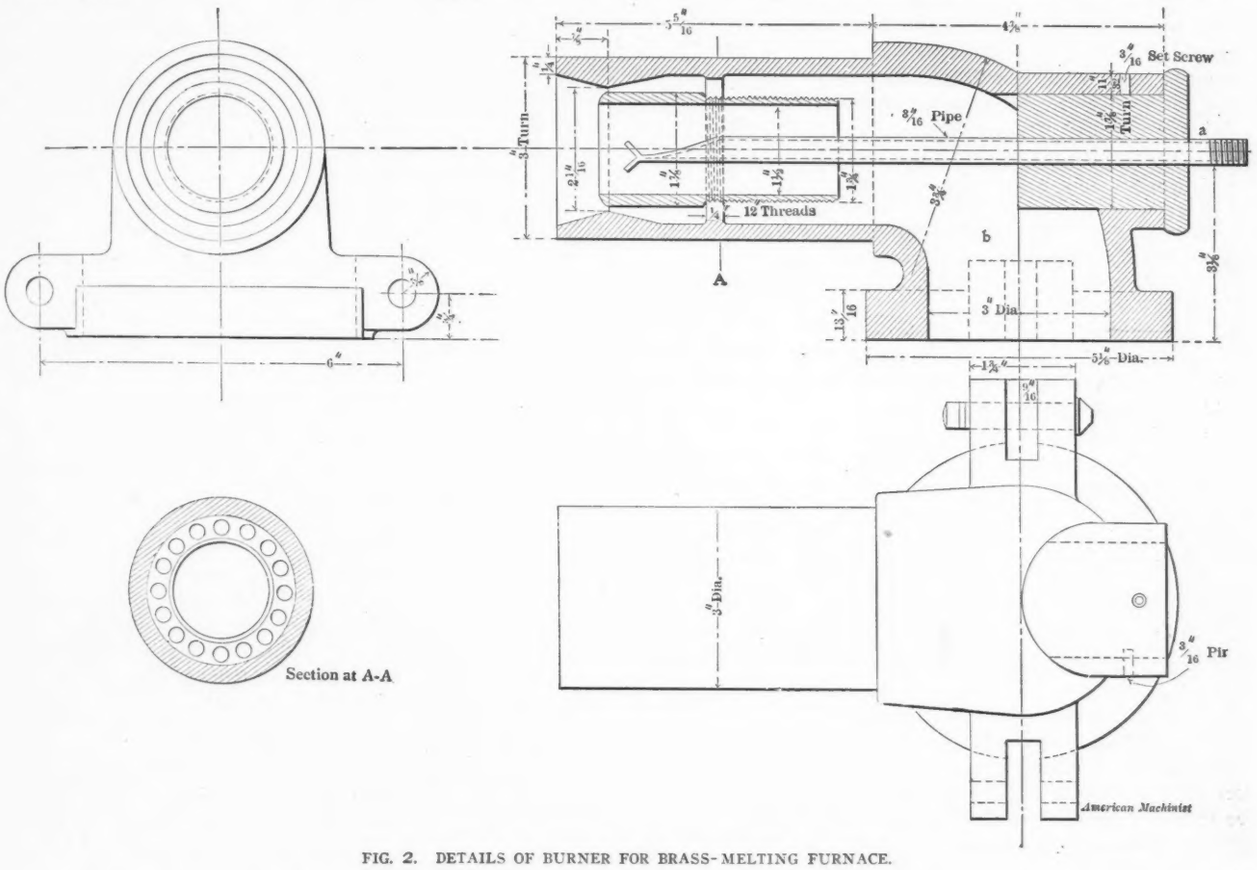


FIG. 2. DETAILS OF BURNER FOR BRASS-MELTING FURNACE.

The furnace has a capacity of six heats in 10 hours, the amount of metal melted at a heat ranging between 300 and 500 lb. It has proven so satisfactory that another one is being made of greater capacity, the increase being obtained by placing a burner at each end, the outlet for the gases being at the center, instead of one end. This will permit of replacing the lining with greater facility.

W. Stewart, of Glasgow, Scotland, in U. S. Pat. No. 794,198, July 11, 1905, proposes to mix zinky ore with an alkali bisulphate and with sodium chloride, and furnace the mixture at a red heat. Zinc salts are recovered from the solution obtained on lixiviating the furnaced product.

Turbine Pumps in the Anthracite Coal Field.

SPECIAL CORRESPONDENCE.

Several turbine pumps have been working in the anthracite field of Pennsylvania for about two years, and at present a number of installations are being made. Since Appold exhibited his model of a centrifugal pump in 1849 (at the meeting of the British Association at Birmingham, England), much interest has been taken in this type of pump. About three years ago numerous attempts were made to better the efficiency of the pump. In America, H. R. Worthington has been experimenting in this matter, among others, and Jaeger in Germany; as a result of the efforts of manufacturers and of others, this type of pump has reached a high degree of perfection. The turbine pump is the converse of the water-turbine working under a head. The casing is built of heavy material; bearings are isolated from the casing, and consequently no foul water gets into them. Also an inclosed impeller is used.

It is interesting to note the different stages of development in turbine practice. Originally water was delivered to a tank 100 ft. above the turbine; then another pump lifted this water 100 ft. higher to a third pump, and so on. Now this method is entirely done away with; tanks are not used. In the next step, the water column of one pump was connected with the suction of the pump above; a later development did away with this form of connection. As built at present, the impellers are on the same shaft, and the discharge of one impeller is connected to the suction of the next (all in one casing, on the same bedplate), thus making practically one machine and requiring only one motor. These pumps are built to work at any angle, so that in unwatering mines, pumps are loaded on trucks, in slopes, and on floating stages, in shafts. A turbine will pass, without any trouble, any foreign material that will enter the water passage through the impeller.

The number of revolutions of a turbine are the same for a head of 100 ft. as for one of 1,000 ft. The speed does not increase with the load, but more power is required. The velocity of the water in the suction and discharge is constant, and no shock is felt in the pipe.

One of the highest turbine lifts in successful operation at any mine in America is at Butte, Mont., where the plant consists of two units, each capable of delivering a maximum of 1,000 gal. per min., against a head of 1,350 ft., the work being done in 12 stages.

Among the turbine pumps that have been in successful operation in the anthracite field, one at a colliery of the Delaware & Hudson Co. has been in operation for two years, and the acid mine water has not removed the tool marks from the metal. A special composition-metal is used for these turbines; it con-

sists of seven parts copper and one of tin. At McFarland shaft (D., L. & W. Coal Department) another turbine pump is being installed; this pump removes water from the Avondale mine. It has a capacity of 2,800 gal. per min., against a head of 100 ft. At times the water rises rapidly in this shaft, sometimes coming close to the surface. This pump has a vertical shaft and is capable of running submerged. The motor is placed 90 ft. above the pump.

The turbines are classed as high and low-lift pumps. The latter are used in the anthracite field in connection with the washeries. Water containing up to 25% of fine coal has been successfully lifted 200 ft. by these pumps.

Among the turbines that are being installed at present in the anthracite field is one at the Hampton plant; this is a 5,000-gal., 500-ft.-head installation, driven by an 800-h.p. motor. A 1,000-gal. turbine is being installed by the same company at the Auchincloss mine, where it is to pump water 600 ft. Among the other turbines being installed in the anthracite field are those for the Philadelphia & Reading Coal & Iron Co., the Delaware & Hudson, the Lehigh Valley, the West End Coal Co., and the St. Clair Coal Co.

A good illustration and one which tests the capability of the turbine pump, is found in the unwatering of a certain mine. The workings contain 2,000,000,000 gal. of water. There are two shafts and two slopes on the property; the shafts are 800 ft. deep, and the slopes are 400 ft. on a steep pitch. To do this work it will probably take eight 12-in. turbines (4-stage type), pumping 4,000 gal. per min. Down to the 400-ft. level, two pumps will be placed on each slope, and two in each shaft. It is estimated that this water can be removed in 85 days (a remarkable showing).

Turbine pumps are being installed under all conditions; in some instances, they parallel plants of other types. It will be interesting to learn the results of comparative tests in some of these installations.

In the manufacture of slag cement, A. F. Le Chatelier, in French patent No. 351,821, Feb. 25, 1905, proposes to add to the liquid slag from blast-furnaces predetermined quantities of the necessary ingredients, *i. e.*, lime, silica, and iron and aluminum oxides, so as to give to the mixture the composition of the cement it is desired to produce. The materials added are pre-heated so as to avoid lowering the temperature of the slag too much and the product is granulated as usual.

The final products of combustion of a fuel are water and carbon dioxide, neither of which will produce the "smoke nuisance." The latter is a certain indication of incomplete combustion.

Bag-House Experiment With the Taverner Process.*

BY HENRY RUSDEN.†

Recent experiments for the saving of gold carried off as fume and dust from the Taverner process, at the Ferreira mine, South Africa, demonstrated that the losses were negligible. The method and results are worthy of some attention. A bag-house was erected in order to filter the gases drawn from the pan furnace, to prove conclusively how much gold was being carried away by the draught, in too finely-divided state to be caught in the baffle chamber.

The furnace gases were led by a culvert to the baffle chamber; thence through the tubes of an old boiler, where they were cooled by circulating water; thence through a reversed U-flue, drawn by an aspirating fan; and finally to the bag-house, a brick structure, in which flannel bags were employed for the filtering. In the first experiment a 12.5-in. fan was run at 1,100 r. p. m., and six bags were used. The dust caught proved extremely light, and had the peculiarity of burning like touch-paper when lighted; 63% of its weight was lost by burning.

The first run assayed by sample 24 dwt. fine gold and 46 dwt. silver per ton. In the following runs more bags were used to increase the filtering area, and a larger fan was operated at a higher speed. In the last experiment a 17.5-in. fan was rotated at 1,638 r. p. m., and (as in the other experiments) there was a failure to obtain a smelting temperature in the pan-furnace.

A water gauge was connected and registered 2 in. pressure in the bag-house. A water-tower was then erected and connected to the bag-house chamber, so that the gases would have another outlet through a heavy spray of water. This spray carried down all the dust which escaped the bag-house, the water then running to a settling tank. The bags and chamber were thoroughly cleaned out and smelting resumed; the water gauge under these conditions registering 1 in. pressure. The cyanide works clean-up was smelted; the estimated fine gold from this run was 1,229.97 oz.

Weight of dust, caught in bag-house	70 lb.
Weight of dust caught in settling tank (from water tower)	5 "
Total	75 lb.

Assay value of dust, 38 dwt. fine gold per ton.

	s.	d.
Total fine gold in the dust, 1.425 dwt., value, say	6	0
Estimated cost of power driving fan for 24 hours	2	2
Estimated cost of pumping water for cooling gases and supplying tower	7	6
Total	9	8

*Abstract from a paper read before the Chemical, Metallurgical and Mining Society of South Africa.

†Assayer, with Ferreira Gold Mining Co., Johannesburg, S. A.

It is therefore evident that practically no gold is carried over from the test furnace, and very little from the pan furnace, if the charging is done in a careful manner.

The Ferreira pan-furnace is charged in the following manner: The fire is lighted about 10 hours before the clean-up is ready, by which time the brickwork is thoroughly hot. Any by-product lead on hand is then melted in the furnace to form a bath, or a little litharge is reduced for this purpose. The damper is closed tightly and a few shovelfuls of roughly-broken slag are thrown in the lead bath; then the wet, fluxed clean-up is charged, this in turn being covered with crushed pan-slag from previous smelts, broken to about ⅜-in. cubes.

The damper is not opened for about 20 minutes, during which time the radiated heat from the furnace renders the slag cover pasty, which to a great extent prevents any dusting. The fire is then urged, and smelting carried on as rapidly as possible. When No. 1 charge is smelted down level, No. 2 charge is put in with the same precautions.

The Mumford Slime Process.

The Mumford slime process has been experimented with at the Robinson Deep, Transvaal. It is carried out as follows: The tailing from the battery is passed over a spitzlutte, which separates the sand from the slime; the sand is treated by leaching in the ordinary way. The slime is run into a circular agitation vat and allowed to settle, and the water is run back in the battery. When sufficient thick slime has been collected in this way the water is decanted off, leaving a thick slime containing about 40% of moisture. Water and return solution from the dam are added till the slime is in the proportion of one part of dry slime to 1½ parts of water. Cyanide is added to make the solution up to a strength of about 0.02% cyanide.

The pulp is agitated for a few hours till the gold is in solution. It is then run into a cylinder, where an electric current is passed through the pulp precipitating the soluble gold on the mercury cathode. The treatment of the slime is accomplished in about 16 hours. The precipitating cylinder is made of steel plates, supported on rollers and revolved at 6 r. p. m. The ends are of wood, from which the anodes are supported; the anodes are carbon rods, arranged parallel to the shell of the cylinder and about 6 in. distant. The inside of the cylinder is lined with copper, which is amalgamated and forms the cathode. An excess of mercury is also added, so that as the cylinder revolves, the copper lining passes under the mercury and thus renews its surface.

Coal has been discovered on the Chindwin river in British Burma.

THE ENGINEERING AND MINING JOURNAL

Published Weekly at

505 PEARL STREET, NEW YORK

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Canada, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.

To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 32 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; Palace Hotel, San Francisco, and the leading hotels in the principal cities.

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THE ENGINEERING AND MINING JOURNAL.

Entered at New York Post Office as mail matter of the second class.

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ACCORDING TO THE STATISTICS of the Geological Survey, the total value of the metals produced in the United States in 1904 was $542,081,933, against $624,318,008 in the previous year. The decrease was almost entirely due to pig iron, all of the other metals showing either an increase or only an insignificant decrease, the largest increases being in gold and copper.

THE INCREASE in copper output in Arizona promises to put that territory ahead of Montana as a producer, if it has not already done so. In the Bisbee district alone two companies, the old Copper Queen and the new Calumet & Arizona, turned out 9,510,000 lb. of copper in August; and in other districts there has been some gain, also.

A NOTEWORTHY FEATURE OF the recently published report of the Philadelphia & Reading Company is the large bituminous coal tonnage carried by the road. Only a few years ago the Reading was exclusively an anthracite road; last year it carried 9,184,421 tons of bituminous coal, this forming 43.3% of its total coal traffic. Through its conections with the Clearfield district and with the northern and western districts of Pennsylvania, the Reading has become a considerable factor in the seaboard bituminous trade, besides supplying the large manufacturing towns on its line.

Transvaal Gold Production.

The cable reports the gold production of the Witwatersrand mines in September 416,487 fine ounces; a loss of 12,094 ounces as compared with August, and 3,018 ounces from July. This apparent loss, however, is no more than is due to the fact that September had one day less than August, so that the production was really about level. That no gain was made, was due chiefly to the difficulty in procuring additional labor. The Chinese force increases slowly, while Kaffir labor is falling off faster than the importation from Asia grows.

Moresnet.

The neutral territory of Moresnet, which has for nearly a century possessed the distinction of being the smallest independent State of Europe, and is famous in the mining industry as being the location of one of the largest and earliest exploited of the zinc deposits of the world, has finally been merged with the Kingdom of Belgium. After the Napoleonic wars there was a dispute as to the ownership of this place, covering about 1½ square miles of area, and it was finally allowed to remain self-governing, with certain restrictions. It might have remained in that condition, had not certain enterprising gamblers conceived a plan for its exploitation, a few years ago, which attracted attention to its anomalous position and led to negotiations between Prussia and Belgium, now settled.

Anthracite Stocks.

A good deal has been printed about the storage of anthracite in the yards of the railroad companies, and it has been assumed that this was done in preparation for a strike next spring. This is said, in most cases, without a proper understanding of the real conditions. The fact is, that the heavy output of domestic sizes of anthracite this year has involved an over-production of the small, or steam, sizes. Rather than force this small coal on the market at too great a sacrifice, some of the companies have been storing part of it for a better opportunity. There is no more domestic coal in the storage yards than is usual at this season, and no preparation to meet a future shortage.

Indiana Coal Consolidations.

The formation of several large combinations of coal-mining companies in Indiana recently, does not seem to have ended the movement to consolidate the coal industry of that State. The Vandalia Coal Company, which owns a number of large properties, and which was organized only a few months ago, has bought a large interest in the Indianapolis Coal Company, another recent consolidation; and makes no secret of its intention to secure interests in all the coal-mining districts of Indiana. The Vandalia company is known to have strong railroad backing, and the object is probably to bring the coal trade of the State under the control of the large carrying companies.

Graduates of Mining Schools.

We regret to have misquoted Professor Christy in our recent editorial under the above caption, but our regret is tempered by a good deal of satisfaction in eliciting from him the views which are expressed in his admirable communication published elsewhere in this issue. The subject under discussion was really treated only incidentally in the original paper to which

reference is made. The latter dealt chiefly with the broad principles of education in mining engineering; and in the consummation of that purpose, it constitutes one of the most, if not the most, masterly discussions of the subject. Its distinguishing characteristic is not so much in its appeal to the technical pedagogists, as in the effect which we conceive it will have on the young men who are now, or are going to be, students in the mining schools. To all of them we suggest it will be a highly valuable *vade mecum*.

Concrete Hollow-Blocks.

The recent prize competition conducted by the *Engineering News* and the *Cement Age* was remarkable chiefly in two ways, viz., the small number of competitors (there were only twelve), and the absence of professional writers from the list. These two features are really quite closely connected. The subject is so new that it had no literature at all at the time of this prize competition. Consequently the latter limited itself naturally to those who had been practically engaged in the business, and the number of such men who would venture to launch themselves upon the unknown sea of technical writing was small, as usual. The professional writer, whose work is to a large extent compilation, had no chance in this case because there was nothing to compile from.

This is really a matter for regret, rather than for humor, because it is the professional writer, with knowledge how properly to compile, digest, and epitomize the cruder efforts of others, who makes a good deal of our excellent technical literature. The practical man, unskilled as a writer, is apt to be unsatisfactory. This appears to have been the case in the recent prize competition, wherein the essays of both of the prize-winners were obviously disappointing to the judges.

Natural versus Induced Draught.

A good deal has been written on this subject, both by the advocates of mechanical draught and the conservative engineers who adhere to the chimney. Some have expressed the opinion that the time would come when excessively tall chimneys would remain only as monuments to the folly of their builders. Others have foreseen the time when all chimneys as means for producing draught would be abandoned, at least in new constructions. Chimneys continue to be built, however, and moreover the increase in the number of chimneys upward of 300 feet in height is noteworthy, especially in connection with smelting works. The Grant chimney at Denver and the Orford chimney at Constable Hook are overtopped by few in the United States; while recently a chimney nearly as high has been completed at Butte. In metallurgical practice the necessity, in many cases, of dispersing the the smoke high in the atmosphere is an important consideration in addition to suction power.

The chimney will never be entirely dispensed with. At the same time the employment of artificial draught will increase. Each system has its advantages, which make the choice a matter of engineering determination in each particular case. In connection with the chimney the principal subjects are first cost, interest on the investment, maintenance and depreciation. In connection with mechanical draught systems there are the same items as for the chimney, plus cost of operation. The relative economy is capable of accurate determination; the value of the various factors is, however, often not truly appreciated. Both sides of the question are very fairly presented, with hardly any opportunity for criticism, in the paper by Mr. John W. Cobb, which is published elsewhere in this issue.

New Copper Enterprises.

A noteworthy feature of the present high price for copper has been the comparatively few new enterprises in which the public has been invited to participate. It will be remembered what a large number of new ventures, requiring money for their development, were brought out during the boom of 1899; especially ventures in the Lake Superior region. There have been several new companies put on the market during the last year, but they have been to a large extent going concerns, which have already been developed, in some cases to the dividend stage, by experienced mining syndicates. This kind of development is going on all the time, and will continue so long as copper remains so much in demand, as to which there is little to be feared. Copper and rubber appear to be the two important commodities of which it is difficult to produce enough to keep pace with the increase in consumptive demand. This gives prospecting ventures in copper mines a very sound basis, and incites a keen search for all possibilities of opening new mines.

An encouraging feature in American copper mining is the continued disclosure of new resources in the old districts. Probably there was never so much activity at Lake Superior, not even in 1899, as there is at present, nor so much prospect of developing new production. Butte has been supposed to be at its zenith, but more or less as a surprise an important new group of producing mines, already paying dividends, has lately been developed there. Bingham has clearly a great record still to make, its immense resources of disseminated ore having as yet been scarcely more than sampled. In Arizona, an increasing production is coming from Bisbee, Jerome, Globe and Clifton, not merely from the old mines, but also from new ones. It is to this Territory, together with Sonora, commercially a part of the same region though politically a State of Mexico, that we look for the greatest increase in American copper production in the near future.

The Importation of Zinc Ore.

The question as to the importation of zinc-blende ore into the United States was supposed to have been settled at the hearing last July, but the smelting interests which seek to import this class of ore free of duty succeeded in carrying the case higher up, in fact, to Secretary Shaw, and developed a claim of such character as to necessitate reference of the whole matter to the legal department of the Government for an opinion.

Zinc-sulphide ore is not specifically mentioned anywhere in the tariff of 1897. Until the American miners made their protest, it was entered under the guise of lead ore, or silver ore. The miners claimed that it was dutiable at the rate of 20 per cent, under paragraph 183 of the law, which reads:

"Metallic mineral substances in a crude state, and metals unwrought, not specially provided for in this act, twenty *per centum ad valorem*."

The smelting interests, abandoning the previous argument that zinc ore is lead ore, now refer to paragraph 614 of the law, which, under the free list, enumerates:

"Minerals, crude, or not advanced in value or condition by refining or grinding, or by other process of manufacture, not specially provided for in this Act."

In an apparent conflict of this kind, it is important to determine the intention of the framers of the law. In the present case we do not believe they had any intention; in fact, no thought, that zinc ore would ever be imported into the United States. The matter depends upon the technical-legal interpretation of the phraseology of the two paragraphs.

Paragraph 183 is the more precise as to zinc ore, inasmuch as it specifies "metallic mineral substances." Paragraph 614, moreover, covers only minerals that are "not advanced in value or condition by refining, or grinding." Most zinc-sulphide ores are thus advanced in value.

Doubt as to the classification of ore under paragraphs 183 and 614 would appear to be confined to crude, lump ore; there ought to be no doubt as to the classification of concentrate. If zinc blende can be legally imported duty free, it will be gratifying to everyone except certain mining interests, and we do not think it will be to their advantage in the long run to pinch the smelters and hold up the consumers so much as they would like to do. We objected strongly, however, to the evasion of importing zinc ore under the name of lead ore.

The Registration of Mining Companies in London.

During the last few years the exactions of the tax collector have caused a good deal of worry to directors of mining companies in Great Britain. In the first place, the registration of a new company costs a large sum of money, amounting to over a quarter of a per cent on the nominal capital of the company; in the second place, the income tax seems to have settled down in a time of peace to an even shilling on the pound.

With regard to the first item, a quarter of a per cent may not seem a large tax, but it is to be remembered that it is on the nominal capital of the company and not on the working capital or cash actually subscribed. In the case of a company formed to exploit a big undertaking, it practically means that several thousand pounds have to go to the tax collector. It is not our purpose now to discuss the principle of taxation or the merits of the present practice in Great Britain. We refer to the matter only to remark that the policy is tending to transfer the registration of companies from London to places where the fees are lower, if that can be done without conflict to the general convenience.

The second item, that of income tax, appeals chiefly to the investors outside of Great Britain, rather than to the resident there. Wherever the company is registered, the Britisher has to pay income tax on his dividends. But American, German and French investors do not like to pay a British income tax, and for this reason, especially, there is a tendency to register companies abroad.

Two noteworthy instances may be mentioned. A few weeks ago we gave details of the flotation of Oroville Dredging, Limited, which has been formed by the Venture Corporation, of London, in conjunction with Mr. John Hays Hammond, to acquire various dredging properties in California. This company has been organized under American laws, though the bulk of the underwriting has been arranged in England. The other case is the Zinc Corporation, which is to be formed in London to acquire Broken Hill tailings, as outlined by our London correspondent in our issue of Sept. 16. This company is to be registered in Melbourne, with the object of reducing organization expense. Whether this new system will extend itself remains to be seen. Englishmen have heretofore been well satisfied with their laws as to limited liability companies; in trying something else they take the chance of pitfalls, which may offset the supposed advantage of foreign registration. The experience of British and Continental investors in American companies has not, however, proved unsatisfactory on the whole; nor have their ventures in certain prominent Australian mining companies been in any way unfortunate.

Rectitude as a Science.

This is history. There was once a man in charge of a large laboratory at a larger smelting plant. The chemist was a well meaning person, with good training and of strict principle; but when he came up against a practical test—for the moment—it made him dizzy. He had been troubled by bookkeepers and clerks from the ore-settling department, with the intimation that his results were too low; he had become used to that. But when—in one day and in one half-hour—the head ore-clerk, the head bookkeeper and the visiting head engineer came at him with more than insinuation as to the accuracy of the low results reported, he lost his grip for the moment. The place might be full of 'graft,' and the air was hazy and surcharged as though ominous of impending disturbance. He consulted his practical friends, the chief sampler, the skillful and trusty assayers. It was evident—as even the tyro knows—that that last trace of lead in the bullion could be retained, or removed, by the final heat in the cupel. He tried the 'expedient,' and got results correspondingly higher; but, before he turned them in, he laid the whole matter in person before the local head superintendent. The canny Scotchman was a man. With a touch of almost justifiable profanity, he turned to the chemist: "No, Mr. Blank, you stick to facts. If there is any twisting to be done, we can do it; but we must rely on you for facts. You are not afraid to have your figures umpired, are you?" "No, sir; let them umpire." They did umpire them, to the absolute vindication of the supposedly correct assays in question.

This experience is not unique nor rare. Every chemist in a responsible position meets similar tests, not merely of his honesty, but of his honest nerve. It is to the credit of our chemists and assayers that they are, generally, men of the cleanest integrity. The very contention of each one for his own results is only the reverse side of his belief, not merely in the superior reliability of that particular method and of his skill in the manipulations thereof, but also—and more to the point—in his absolute loyalty in interpreting and reporting his results. Thus the 'crankiness' of assayers is only a synonym of their reliability. What this means to the always over-worked superintendent can not be told in words. But every superintendent knows that if he can stand securely on the figures of his chemist and assayer, he has sure footing; without this he is simply at sea. The confidence that grows between a wise superintendent and a skillful analyst is the keystone in the technical arch which carries the practice, and, like all keystones, it is stronger the more heavily it is loaded. We do not believe there is a case on record where coquetting with technical assaying has led to anything but degradation and shame. Loyalty to simple fact is the road to promotion and to prosperity. Fortunately this also is a natural law. From Geber to Lavoisier, and from Dalton to Bruno Kerl, the echo rings true: "Stick to your results."

Metallics.

The production of quicksilver has been begun at the Black Butte mine, near Cottage Grove, in Lake county, Oregon.

The first electric-lighting station to use incandescent lamps commercially was that of the Edison system at Appleton, Wisconsin, built in 1882.

An ingenious device for the sampling of tailing from a concentrating mill is a revolving wheel, with its spokes made of pipe. The entire stream of tailings is caused to pass over the wheel. The sample is discharged through one of the spokes.

An arrangement has been entered into whereby the De Bavay Tailings Treatment Co., which owns the De Bavay flotation process, will treat the tailings from the North mine, at Broken Hill. A plant capable of treating a minimum of 1,000 tons per week is to be erected.

More than 30 years have elapsed since the alluvial flats of Stanthorpe (Queensland) first attracted attention. Since then immense quantities of tin have been recovered. Stanthorpe is the one place in Queensland where dredge-mining for tin ore has proved to be successful.

It is the practice of some assayers, now not so common as formerly, to roast sulphide and arsenical ores before making the assay. This method is bad. The American Smelting & Refining Co. sent out instructions to its assayers prohibiting the roasting of ore preliminary to assaying.

The report which has been published in various journals to the effect that monazite has been discovered in the Dragoon mountains, Arizona, in sufficient quantity to enable shipments to be made, is incorrect. Regular shipments of wolframite are being made, however, from that district.

The cast-iron supporting plate at the bottom of the shaft of some blast-furnaces is made tight by tamping sand between the shaft and a ridge cast upon the plate. Where this is done, the tamping must be executed with care, as the pressure developed is sufficient in many cases to crack off the ridge and destroy the joint.

The cranes, or chain hoists, used in some electrolytic refineries to raise and lower the anode and cathode plates should be insulated, either by insulating the rails upon which they run, or by installing them with an insulating substance in the suspension. The strain insulator, as used on overhead trolley work, is, in its stronger forms, an effective and cheap device for this purpose.

Zinc, copper and nickel form bronzes of great strength, which have been proposed for making high-pressure steam fittings. They are little subject to corrosion, and in some respects are considered preferable to steel castings. The alloy composed of 70% copper, 12.5% zinc and 17.5% nickel has a tensile strength of 26 tons per sq. in. and an elongation of 23% in 2 in., while the alloy with 70% copper, 10% zinc and 20% nickel has a strength of 36 tons and elongation of 14 to 17 per cent.

In electrolytic copper refineries too little attention is sometimes paid to the insulation of electrically connected portions of the apparatus. An excellent insulator for the deposition tanks consists of a piece of thick glass, 6 by 6 by ⅜ in., laid upon an oak block 4 in. square. The block raises the plate a sufficient distance from the floor, and the overhanging edges of the glass plate afford a reasonably effective drip. The ordinary third-rail insulator, as used on electric railways, is rather better, but somewhat more expensive.

A diamond-drill hole, 5,560 ft. deep, has been put down at Doornkloof, South Africa. A 1⅜-in. core was obtained. The time taken to drill this was 14 months, an average of nearly 400 ft. per month. Three 8-hour shifts were worked daily. The rods were pulled out in lengths of 50 ft. At a depth of 5,000 ft. it required 3½ to 4 hours to raise the rods, and almost as much more time to lower them. Another hole, 5,582 ft. deep, has recently been completed near Johannesburg, the time required to drill it being nine months, an average of 620 ft. per month.

Some assayers in Colorado add fluorspar to the flux for Cripple Creek ores. They state that they obtain higher results in that way. No good reason is presented, however, as to why the addition of fluorspar should contribute to such a result. The statement is made that fluorspar goes through a smelting furnace unchanged, and certain smelters will not pay for the lime content of fluorspar as "available lime." This is, however, erroneous. Fluorspar is a powerful flux. Its addition to the assay charge may possibly lead to higher results because of the production of a better slag.

Brass containing upward of 80% copper is reddish-yellow to red; with less than 48% copper it is gray to white. In the intermediate stages brass has various shades of yellow. The hardness of these alloys is usually greater and the melting point lower than those calculated as the mean of their constituents. The alloys with more than 62% copper can only be rolled cold; those with about 60% copper can be rolled hot or cold, but are less ductile and tough than the higher grade; those with about 50% copper cannot be rolled either hot or cold; with less than 50% copper they lose their yellow color and become brittle, while their fusibility increases. The chief application of the alloy containing about 50% copper is as a solder for copper and brass.

All nitro-glycerine compounds freeze and become hard at about 42°. In this condition they will not readily explode. When large quantities of powder are to be used, a separate building for thawing powder should be fitted with a small steam radiator. Only exhaust steam should be used for heating the same, if possible keeping the temperature of the room at about 80° F. In the part of the room at the greatest distance from the radiator, the powder should be placed on racks to thaw. When but small quantities are required to be thawed, a thawing kettle may be used, this being two water-tight kettles, one smaller than the other (one placed inside the other). The cartridges are placed in the smaller kettle, and the space between the two kettles filled with water of from 120 to 130° F., the kettle being fitted with a cover to retain the heat. Under no circumstances, however, should the kettle be placed over the fire to heat. When more hot water is required, empty out the cold water and fill again with hot water. Under no circumstances should an attempt be made to thaw the powder by placing it in hot water or exposing it to the direct action of steam.

The toy water-glass of our youth has its uses in more than one event of our maturer years. Upon one occasion, floods caused, by the extreme rapidity with which the water rose over night, the submerging under about 10 ft. of water of a valve that, if opened, would relieve the pressure upon the dam. This it was desirable to do, but a method of accomplishing it was not at first apparent; the operation would take too long for an ordinary man to remain under water, and professional divers were not to be obtained. The valve was in such a position that it could not be operated by the use of poles or boathooks. A box was finally built about 20 in. wide and 4 ft. long. This was about 16 ft. deep, and had on one side, near the bottom, a pane of glass, and a piece of rubber packing (such as is used for thin gaskets on pipe lines) with a hole large enough for the passage of a man's arm. The glass and the rubber were let into and formed part of one side of the box. The hole in the rubber was stopped by a wooden plug, pushed in from the outside. The box was weighted with pig iron at the bottom, to hold it vertically and assist in sinking it, ropes were attached to the top, and the whole lowered, with the man (who suggested the scheme) crouched in the bottom. The side with the glass was swung toward the valve, which the man was able to see indistinctly through the muddy water. He shoved the plug out of the hole (its place being taken by his arm, against which the rubber diaphragm was held by the pressure of the water), and opened the valve. Then the box, man and all, was hoisted to the surface, where he emerged, wet and sputtering but triumphant.

Colliery Notes.

Coal has been shoveled, in the writer's experience, at 4c. per ton on a contract basis. In this case the men had to lift it only four feet, and were able to handle 7½ tons per man-hour as a maximum.

With ½-ton coal tubs and four men shoveling into them, 30 tons per hour of bituminous coal is about the best that can be done in unloading and hoisting coal; a round trip of each bucket is made in one minute. The hoisting speed might be increased, but it means more men, and more buckets to gain any advantage.

One of the advantages of the clam-shell bucket for handling coal in unloading from boats is the fact that shoveling is ordinarily required only for the portions of the mass not reached by the bucket. The coal tub, used in some small plants, requires at least two men, and oftener four, shoveling, if operation is to be carried out at an economical speed.

For handling bituminous coal, the clam-shell bucket will not always fill itself, and it is sometimes helped out by men who shovel into it by hand. This, however, is largely dependent upon the experience of the operator; a competent man is able through long practice to swing the bucket as much as 100 ft. from the position it would occupy were gravity alone to control its motion.

Anthracite coal can be handled very simply, cheaply and rapidly by an ordinary derrick and double-drum hoisting engine and clam-shell bucket rig. The speed is often run up to 180 tons per hour with a one-ton bucket when the distance is not great. A single-drum engine with a winch head may sometimes be used, instead of one with the double drum, if minimum first cost is a desideratum.

The object in employing props and timbering in collieries is not to hold up the weight of the roof; but to prevent loose fragments of rock from falling and injuring the miners. No timber could support the weight above the cap at the roof line in heavy strata, were it to break away completely. Props should be set immediately where required, and to be properly efficient they need setting on carefully prepared and stamped foundations.

The devices adopted for handling coal are dependent to a large degree upon the character of the coal, and upon the disposition that is to be made of it. For large capacities, different means will be required than may be used profitably for smaller installations. Anthracite may be handled by means that would not be commercially applicable to bituminous coal, on account of the breakage. So, also, the plant that is adequate and economical for a capacity of 30 tons per hour would fail absolutely for an installation requiring that 150 tons or more should be handled in the same time.

The relative economic values of different classes of coal burnt in boilers of similar construction are in proportion to their evaporative efficiencies. The qualities desirable in a steam coal, however, vary with the conditions under which the coal is burnt. It is now generally recognized that of two coals, one may be superior under one set of conditions and the other superior under another. The value of a steam coal is estimated by the evaporative efficiency, speed of steaming, smoke, amount and nature of residue, sulphur, friability, specific gravity and liability to decomposition.

At the University of Birmingham, England, there is an experimental coal mine to furnish practical instruction in underground surveying, ventilation, systems of timbering and methods of haulage. These workings are underground, have an upcast and a downcast shaft, and the entries (or galleries) are built largely of concrete (the roof being strengthened by steel girders). The mine (with an area of over ¾ acre) will be ventilated by a Capel fan, 5½ ft. in diameter; it will be drained by a small pump at the bottom of the downcast shaft. The machinery will be driven by electricity.

Occasionally in making surveys in coal mines (particularly in the anthracite region), it is necessary to run lines through small and tortuous headings or "proving holes." Sometimes the transit, as attached to the tripod, cannot be used in such places. If a wooden powder keg (or small box) is available, the transit head may be unscrewed from the tripod and set upon the keg as a support. The keg should first have fine coal (or similar material) banked up around it, so that it will form a comparatively solid base for the transit head. If the passage is too contracted for a man to pass around the transit when it is set up, then two men will be necessary to take sights, one for foresight and the other for backsight.

There is sometimes difficulty in loosening the head of the transit from the tripod. This can often be readily accomplished (when ordinary means fail) with a piece of stout cord and a stick. A loop is made in one end of the cord, which is then wrapped several times around that part of the transit head next to the tripod. Place the stick in the loop and use it as a lever, turning it in the direction required to unscrew the head. A trial of this method will show which way the string should be wound. This scheme is the reverse of the method used on many small engines, in which a rope is given a few turns about the winch head on the end of the drum shaft. The friction between the rope and the head, when a man holds the rope tightly thereon, will enable a considerable load to be moved by the engine.

Correspondence and Discussion.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Graduates of Mining Schools.

Sir—In your editorial of September 23, 1905, under the above title, you unintentionally credit me with statements that I have never made, and views that I do not hold.

In the first place, it is stated that I appeared to hold a different view from that held by President McNair in his recent paper on "American Mining Schools." On the contrary, I am in entire agreement with everything he says; and you will notice that he very correctly states the position which I took in 1893 in a paper read at the World's Engineering Congress in Chicago. In that paper I showed, by an analysis of the statistics of the United States Census reports on the mineral industry and on the enrollment and the number of graduates of American mining schools, that there was a direct ratio between the increase in the mineral product of the United States and the number of students and graduates of American mining schools. I showed that between 1880 and 1891 the increase in the number of graduates in the mining schools was 1.3 times, and the value of the mineral product 1.82 times. President McNair, in his recent paper, has taken up the inquiry where I left it off, and has compiled figures for six of the leading mining schools of the United States. He shows that the increase in the enrollment and in the number of graduates of the mining schools continues to bear a fairly constant relation to the number of wage-earners employed in the mining business and to the value of the mineral product; so that, instead of my being in disagreement with Professor McNair, the contrary is the fact; and statistics, as far as they go, show a remarkably healthy relation between the supply and the demand for mining engineers.

In reference to the paper which I read before the Congress of Arts and Sciences in St. Louis last summer, your editorial continues as follows: "In a bulletin on 'Present Problems in the Training of Mining Engineers,' recently issued by the University of California, he ventured the statement that our mining schools are turning out too many graduates." Through the carelessness of a local reporter, such an erroneous statement has already been widely published by the daily papers.

Now, nowhere in my paper, nor anywhere else, have I ever made any such

statement. Moreover, I did not even raise the question of attendance at mining schools in my St. Louis paper; and, in fact, I hold the contrary opinion.

The quotation from my paper which follows in your article is correctly stated. The conclusion I have drawn from such statistics as are available at the present time is, not that there are too many graduates from American mining schools, but that the legitimate needs of the industry can be adequately supplied by the already existing schools. There was a time when it was impossible to get any training whatever in mining engineering in America, and students were forced to go to Europe for such training. That period has ceased, and there certainly exists in America at the present time no deficiency in the number of mining schools. I have ventured the opinion that all the legitimate needs for training mining engineers could be better and more cheaply satisfied by half a dozen, or, at most, a dozen strong mining schools so distributed throughout the country as to meet the local needs, than by a larger number of weak ones.

I have nowhere said that some of these schools ought to be abolished, as some of the daily papers have stated. The inexorable law of the survival of the fittest will settle this question without any artificial interference. The rapid growth of engineering schools of all kinds in the United States is really an indication of a healthy interest and a growing faith in science and its application to the affairs of life. Moreover, because a school is now small and imperfectly equipped is no reason why it should not survive in the struggle for existence if it is essentially sound, as all large things come from small beginnings. I have called attention to the excessive number of mining schools in existence in America on account of the fact that it leads to a needless waste of money and energy. A certain duplication of mining schools is not only necessary, but wise, as such an institution having more than, say, a thousand students, may easily become unwieldly, and this duplication enables each school to fit itself to its environment and satisfy the needs of some large mining district better than could be done by any single school.

But a really good mining school is a very expensive institution, and it would be very easy to show that a thoroughly good one could not be established and equipped with modern laboratory and museum facilities and a competent faculty without an endowment of at least two million dollars. Now, as I shall point out later, the large number of mining schools already in existence fail to fill all the vacancies which at present exist. There are two possible ways of supplying the deficiency; either by increasing the number of mining schols, or else by increasing the efficiency of those already in existence. In my judgment the latter is the wiser solution of the problem, and my suggestion that it would be an advantage if the number of mining schools were limited to six, or, at most, a dozen, is simply another form of saying that it is better for a country to have a limited number of strong schools well attended than a large number of weak ones poorly attended. A similar problem exists with regard to the medical schools.

In America the mining schools have grown up in entire independence of any central authority, and the only remedy I have suggested, is not the extinction of such schools, but merely that the best established schools should agree upon some common basis or standard for the issuance of their degrees, which may be fixed throughout the country. I believe that this suggestion will commend itself to all friends of the profession in the United States.

As the question of the relation between the supply and the demand for mining graduates has already been raised in this discussion, a word may be added on that subject. President McNair has shown that for the year 1903-04 there were 1,200 students enrolled in the six leading mining schools of the United States, and there were 175 graduated. The number of graduates is a little more than half the number of positions which I have estimated to be open each year. Present statistics are not available for all the American mining schools, but in the year 1896-97, the total enrollment in twenty-nine schools then existing in the United States was only 793. Of these schools, twelve had no students at all that year, and in the total given were included also some students in civil, electrical and mechanical engineering and chemistry, which were not segregated; so it is altogether probable that in spite of the large number of mining schools in the United States, they are not yet turning out a number of graduates equal to that which I have estimated as needed to fill existing vacancies.

In the University of California, about one-fourth of those who enter the freshman class finally graduate at the end of their four years' course; so that to produce one graduate per year would require, roughly, four freshmen, three sophomores, two juniors and one senior to be in attendance; or to produce one graduate per year would require that ten students should be in attendance. Hence to graduate 330 mining students per year would require an attendance of 3,300 students; or if there were only six schools in the United States, an attendance of 500 would be required, or for twelve schools, 250 each.

Of course it is true that many men who enter the mining school and graduate, afterward turn their attention to other things. Some go into business; some drift into other branches of engineering or chemistry; while others turn their attention to some other industry; also, many American mining engineers find occupation in foreign countries.

Taking all these facts into account, as you have already done in your editorial, it is very evident that the present supply of mining graduates has not yet reached the limit of the demand, and this accounts for the fact that there is such an active demand for the graduates of all the leading mining schools.

In conclusion, I feel sure that the world's supply of engineers will never be equal to the demand; for two good reasons: In the first place, success in engineering requires native powers of mind, body and character that are rare. In the next place, it implies a long and severe course of training. Hence many graduates in excess of the number of vacancies are necessary. "For many are called, but few are chosen."

Moreover, the profession of engineering is one in which the creative faculty plays a controlling part, and it is no exaggeration to say that the more engineers there are, the more there will be needed; for each one, through his productive activity, creates work for others in those great enterprises which characterize our civilization.

S. B. CHRISTY.

University of California, Berkeley, Cal., Sept. 29, 1905.

Cupellation.

Sir—In an article in this JOURNAL (Aug 12, 1905, p. 245) H. R. Edmands advises the use of a form of cupel shallower than that usually supplied by the makers.

Some years ago, having a large number of silver assays to make by the dry method, and time being a great object, a similar train of reasoning led me to the same conclusion. Accordingly, I had a plunger made giving a cupel only about ¼ in. deep (instead of ½ in.) and found a most distinct acceleration in the speed of cupellation.

I also found that it was possible to use only one-half the quantity of lead required with the deeper form of cupel; the molten bead of lead spreading out further on the flatter surface, and preventing the formation of "grains" on the side of the cupel. The net result was a cupellation in 10 minutes instead of half an hour.

Here, however, I encountered an unexpected difficulty. The "springing" (by which I mean the rapid evolution of occluded oxygen at the moment of setting, causing the formation of excrescences and a slight loss of silver), increased from a normal 1 or 2% in the deep form of cupel to 40 or 50% in the shallow one. Whether this was due to very rapid oxidation, or (as I am inclined to think) to the lack of the protection afforded by the higher sides of the ordinary cupel, I was unable to determine.

Attempts to get over the difficulty by luting up the muffle just before the last traces of litharge were absorbed, and also by lowering a pad of asbestos cloth onto the assays were unsuccessful. The shallow form of cupel was reluctantly abandoned.

A. T. FRENCH.

Batum, South Russia, Sept. 12, 1905.

Enrichment in Veins.

Sir—Your first question can be answered promptly. The first 1,000 ft. is the richest in every mine I have seen.

I think there is no rule in respect to the increase or decrease in width of fissure veins in depth; considering that they are supposed to be formed by ascending waters, it is rather strange that we should not have obtained some impression of uniform effects from a uniform cause. Of course there is a depth at which pressure may close a fissure; but, on the other hand, we have the supposed increase of activity due to heat, strength of solution and hydrostatic head, which, collectively, ought to increase the attack upon the walls in every case where metasomatosis is active. It is the failure to observe the effects (which ought to spring from the forces we recognize in ore deposition) that throws doubt upon all our explanations. They may be true severally, but their combined action is not what we imagine it should be

JOHN A. CHURCH.

Mexico City, Sept. 5, 1905.

New Publications.

Journal of the American Society of Naval Engineers. Vol. XVII, No. 3, pp. 589-925. Illustrated. Size, 6 by 9 in. Paper. Price, $1.25. Washington, 1905.

Preliminary List of Deep Borings in the United States. By N. H. Darton. 175 pages. Size, 6 by 9 in. Paper, 75c. Washington, 1905. Government Printing Office.

Annual Report of the Secretary for Mines of Victoria for 1904. 122 pages. Size, 8¼ by 13 in. Paper. Price, $2. Melbourne, 1905. Robt. S. Brain, Government Printer.

Second Year Chemistry. By Edward Hart, Ph.D. 165 pages. Illustrated. Size, 5½ by 7 in. Cloth. Price, $1.25. Easton, Pa., 1905. The Chemical Publishing Company.

Report of Progress of Stream Measurements in 1904. By F. H. Newell. 384 pages. Size, 6 by 9 in. Paper. Price, $1.25. Washington, 1905. Government Printing Office.

Experiments on Steel-Concrete Pipes on a Working Scale. By John H. Quinton. 61 pages. Illustrated. Size, 6 by 9 in. Paper. Price, 50c. Washington, 1905. Government Printing Office.

Annual Report of Under Secretary for Mines of Queensland for 1904. 160 pages. Size, 8¼ by 13 in. Board. Price, $2. Brisbane, 1905. George Arthur Vaughn, Government Printer, William street.

Engineering Chemistry. By Thomas B. Stillman. Pages, 597. Illustrated. Size, 6 by 9 in. Cloth. Price, $4.50. Easton, Pa., 1905: Chemical Publishing Company.

This is the third edition of the well-known work, which is recognized as a thorough compendium of modern standard methods. In its present edition it has been materially revised and brought up to date. A good many new sections have been added. There is so much of great value in the work that the technologist will overlook its deficiencies in certain respects. A book of this character can hardly be expected to be perfect. The appreciation of its value is indicated by the continued demand for it, which has made a third edition necessary.

The *Street Railway Journal,* published by the McGraw Publishing Company, of New York city, has established, in its issue of Sept. 23, a new standard—both in attractiveness and usefulness. This is a leading exponent of the electric railway industry, and the publishers have taken the occasion of the various street railway conventions, which were held in Philadelphia during the week of Sept. 24, to produce what is believed to be the most elaborate edition of a street railway periodical ever published.

The book contains 184 reading pages, over 200 pages of advertisements and about 60 pages devoted to a dictionary of electric railway material, supplies and apparatus. This dictionary gives definitions for practically everything used by an electric railway, and its publication is an entirely new departure in technical journalism.

The reading matter in the issue is devoted exclusively to an elaborate analysis and study of the history, organization, financial characteristics, operating methods and physical properties of the Philadelphia Rapid Transit Company, and the articles embrace careful and comprehensive reviews.

Questions and Answers.

Dust Chambers.

What is the best design and construction for a dust chamber? F. V. S.

Answer.—The best design for a dust chamber, or flue in which dust is to be settled out of furnace gas, is unquestionably a simple canal of sufficient area in vertical cross-section to reduce the velocity of the gas to a point at which the dust will deposit itself by gravity. Reduction of velocity to 4 ft. per second is quite safe. In making the computation, allowance must be made for the air which will almost inevitably leak in through the walls of the flue. Flues should, moreover, be made of a width greater than their height.

Obstructions to the draught, such as Freudenberg plates, and Roesing wires, promote the deposition of dust, but they necessitate increased draught power. They are no longer used, at least not in American practice. Zig-zag flues are a bad design. They increase the length of the travel of the gas, but do not reduce its velocity to the extent and in the manner which is desirable. The correct method is to discharge the gas into a chamber, which acts like a lake into which a stream of muddy water may empty, while a stream of clear water may issue from the other side.

At nearly all of the modern lead and copper smelting works the dust-flue is simply a large canal. Drift-walls have been abandoned as restricting the cross-sectional area. Sloping bottoms are, however, sometimes provided, especially near the furnaces, where the major portion of the dust deposits. They facilitate the removal of dust from the chambers. Such a construction is important where a great deal of dust is made. For the same reason a system of overhead dust flues has been constructed at one plant. That is, of course, very expensive.

As to construction, many dust flues are built now of concrete, reinforced by expanded metal or coarse wire-screen. This method of construction is satisfactory if properly done. Such flues are built to very large size, as at Murray, Utah. Flues are built of brick, with semi-circular roof arch. This construction is more satisfactory in flues of moderate size than in very large ones. Some very large flues have been built with two side walls of brick, and roof of I-beams, laid across the two walls, between which small brick arches are constructed, as in one form of fireproof floor construction.

Stamps, Rolls and Ball-Mills.

What is the relative efficiency of stamps, rolls and ball-mills for the dry-crushing of ore, say to 30-mesh size? T. R. E.

Answer.—Stamps are very inefficient dry granulators, because of their small screening surface and the inability of the ore to escape from the mortars until reduced to excessive fineness. Power is therefore consumed in comminuting the ore to an unnecessary and undesired degree of fineness. This is invariably disclosed by a screen analysis of the product, which will show a much larger proportion of fine material than the product of either rolls or ball mills. About the best work that stamps will do in dry crushing to 30-mesh is 62 lb. per horsepower-hour. First-class rolls will give approximately four times that output with the same expenditure of power. Stamps are not at all to be recommended for dry crushing.

The ball mill is an efficient pulverizer.

A well designed mill has a large screening area, and means are provided for the material under treatment to escape easily from the action of the balls and go over the screen, through which they will pass as soon as ground fine enough. The product is therefore granular in character and the power consumption is relatively low. The drawback is the high consumption of metal per ton of ore crushed, but this does not offset the advantages in other respects. The ball mill combines crushing, elevating and screening apparatus in a single machine, which for its compactness is especially desirable where small units are required.

For large plants it is questionable whether ball mills or rolls are superior. American practice has been distinctly in favor of rolls, but in Australia ball mills have been extensively employed.

Lead and Copper Refining.

What is the relative cost of refining crude lead and crude copper, referring in the latter case to the copper which is produced from sulphide ore and refined electrolytically? F. W. M.

Answer.—The cost of either lead refining or copper refining is of course greatly dependent upon the conditions under which practiced. For example, the cost of desilverizing and refining crude lead might be $6.25 per ton at one plant, while it might be done at another plant, at the same time, for $4 per ton. These are actual figures from practice. So far as any approximation is possible, it may be assumed that lead ought to be refined, in good practice, for about $5 per ton. Similarly, the approximate cost of refining copper electrolytically is about $15 per ton.

Abstracts of Official Reports.

Broken Hill Proprietary Company, Ltd.

The mining property of this company is located in the Broken Hill district in New South Wales, Australia. The report is for the half year ending May 31, 1905.

General manager G. D. Delprat reports that, at the mine, operations at the open-cut were confined to the quarrying of the material required for filling the depleted stopes underground, and for this purpose 60,111 cu. yd. of mullock were broken and passed into the underground workings. The tonnage of ore mined during the half-year was 296,730 tons, as against 324,535 tons for the previous half-year; the decrease in the quantity being accounted for by the cessation of work during the customary holidays. The cost of working during the period under review was approximately the same as in the previous half-year, and the grade of the ore showed no appreciable difference.

The 1,000-ft. level is now connected with Delprat shaft, and the orebody is of good quality, and of greater width than that found at the 800-ft. level. A gallery is being driven northward in the 1,000-ft. level in order to explore the northern portion of the leases. The 800-ft. level is now supplying ore regularly in gradually increasing quantities. Delprat shaft has been sunk a further 100 ft., preparatory to opening up the 1,200-ft. level, the depth now being 1,120 ft. Stewart shaft has been sunk a farther 105 ft., to a total depth of 755 feet.

The quantity of ore mined was: Sulphide, 293,833 tons; oxidized, 2,897 tons, or a total of 296,730 tons. A recent survey and calculations show that the quantity of ore of ordinary quality in sight is 3,200,000 tons.

In the lead and silver concentration plant the recovery of metals and the cost of working were practically unaltered, as compared with the previous half-year, an increase of 1% in the lead recovery being noted. Six new ball mills were installed for re-grinding purposes, with very satisfactory results. A further increase in the recovery of lead is expected during the next half-year, when the full effect of the new ball mills will be felt.

At the sintering works, 61,786 tons of slimes from the two ore-dressing mills were treated, and 55,880 tons of sintered product was despatched to the smelting works. This is by far the largest quantity handled by this department in any half-year.

Mechanical feeders were introduced into the zinc concentration plant, and various other minor improvements introduced. The total quantity of tailings fed in was 41,292 tons, producing 12,851 tons of concentrates. The tailings resulting from this operation form a valuable material for underground filling; it is very cheap to handle, and packs well. The capacity of the plant is now approximately 4,000 tons per week, the largest quantity put through being 4,200 tons during six days. The working costs have come down very materially, as compared with the previous half-year.

Another chamber was added to the sulphuric-acid plant, making three in all. One Glover and two Gay-Lussac towers have also been erected; 600 tons of strong acid were made during the half-year. A furnace for roasting zinc concentrates has been built, and will be put into commission immediately. It is proposed to substitute for the present roasting plant a zinc-roasting plant, which is expected to give cheaper acid, and at the same time produce roasted zinc concentrates, required for making spelter. In order to better guard the acid plant against the danger of fire, a 30,000-gallon water tank was put up at an elevation of 43 ft. above the ground, dominating the whole of the plant by means of sprays.

The magnetic separators were kept idle during the last term, as the other process for the same purpose gave more economical and rapid results.

The condensing plant continues to do good work, and comes up to expectation. A new chemical laboratory was built on the north slag dump. Mechanical stokers are being put into the boiler plant. Three large new stone changing houses for the men were built over the existing ones, and the old houses are now being removed from inside the new ones. More room will now be available for the men, and better accommodation provided, which became necessary as the number of men increased.

The table given herewith shows the quantity of ore, etc, treated in the smelters at Port Pirie:

	Tons Treated.	Percentage.
Kaolin and silicious ore (inclusive of purchased ores)	3,600	2.68
Sulphide concentrates	70,167	52.29
Sintered slimes	57,301	42.71
Carbonate slimes	3,112	2.32
Total	134,180	100.00

In addition to the foregoing, there were re-treated in the smelters: Fluedust, 1,028 tons; raw matte, 409 tons; refinery drosses, 4,955 tons; producing lead, 3,402 tons; silver, 324,590 oz.; gold, 2,213 oz.; thus making the total quantity passed through the smelters 140,572 tons.

The roasting plant dealt with the following quantities: Concentrates and slimes, 70,608 tons; smelting ore and kaolin, 653 tons; matte, 374 tons; or a total of 71,635 tons. The substitution of shell lime for limestone continues to yield good results.

The refinery treated 34,838 tons of bullion as against 35,851 tons for the previous half-year, producing silver (fine), 2,638,588 oz.; gold, 1,564 oz.; lead (soft), 33,195 tons; antimonial lead, 305 tons. The doré plant treated 44,349 oz., producing 1,564 oz. of fine gold.

During the half-year 44,534 tons of iron ore were landed at Port Pirie from the Iron Monarch quarry. All preparatory works in connection with the limestone quarries, at Point Turton, are now finished. Storage bins were erected, a flying fox put up, manager's house built, and the jetty raised and lengthened. In future all limestone requirements will be taken from here. The coke plant worked very regularly, with the exception of a few stoppages on account of shortness of small coal through interruption of work at the colliery.

The directors' report states that there has been but little new work at Port Pirie of any importance taken in hand since the commencement of the half-year. Some modification has been carried out in the construction of the smelting furnaces, which has been attended by satisfactory results in the direction of an increased recovery of the lead contents of the ore, and this alteration is being extended to the whole of the furnaces in commission. The cost of preparatory work during the half-year amounts to £22,076 5s. 2d., or equal to 1s. 6d. per ton of ore raised.

The whole of the product of the zinc

concentration plant has been disposed of, and contracts extending until the end of 1907 entered into at the rate of 40,000 tons per annum. The erection of works for the manufacture of spelter has been definitely decided upon, and the first furnace will be located at Port Pirie, which work is being proceeded with as rapidly as possible.

The gross profit for the half-year amounted to £170,149 9s. 5d., which, after deducting £22,478 1s. 4d. for depreciation upon the various plants, leaves a net profit of £147,671 8s. 1d. The sum of £16,278 1s. 4d. has been expended in construction, of which £5,499 14s. 10d. was on account of the zinc separation and sulphuric acid plants at Broken Hill, while the balance was distributed over the several plants in varying amounts. The profit per ton of gross ore treated was 9s. 11d., or an increase of 1s. 6d. per ton on the previous half-year's working. After making due provision for all outstanding liabilities, there remain liquid assets, in cash, bullion and other convertible stocks, representing a total value of £423,905 2s. 11d. inclusive of the reserve (£150,000) and insurance fund (£15,500). Two dividends (140th and 141st) of 1s. 6d. per share each, amounting in all to £144,000, have been distributed among shareholders during the half-year.

This half-year just closed completed the 20th year of the Company's existence, and the following statement shows the total production since the inception of the Company in 1885: Gross ore treated, 7,747,306 tons; lead produced, 733,025 tons: copper produced, 4,576 tons; antimonial lead produced, 7,201 tons; silver produced, 129,740,728 oz.; gold produced, 82,933 oz. fine.

Manganese Deposits of Nazareth, Brazil.

The March issue of the *Bulletin* published by the Agricultural Department of the State of Bahia contains a report by Dr. Orville Derby on the manganese deposits recently discovered at Nazareth, Bahia. These deposits are similar in their geological formation to those at Queluz, in Minas Geraes, but differ from the manganese deposits in other parts of the world. The ore occurs in the form of veins, dikes or lenticular masses in the formation of crystalline rocks of various types, which may be included under the generic name of gneiss. These rocks constitute the base of the formation and are cut by dikes, concretionary masses, and nodules of eruptive rocks of different types, among which is granite (this predominating), and the type of rock known as queluzite, which contains the manganese.

Queluzite consists principally of a primitive oxide of manganese and a mixture of silicate of manganese and alumina. The orebodies have an inclination of over 45°. When the surface deposits are exhausted, which are the only ones now being worked, underground mining may be profitably carried on. The surface indications and the work already done give ground for the belief that the manganese mining industry will become permanently established in this district.

Sinking-Pump Condensers.

BY EDWIN M. CORYELL.

The disposition of exhaust steam from pumping machinery in mines is sometimes a subject for serious consideration. The use of long exhaust pipes is costly and inconvenient, owing to the changing position of the pumps in shaft sinking. In mining operations large bodies of water are frequently encountered, making it necessary to have a pump that can be readily moved about, and raised and lowered in the shaft in the least time.

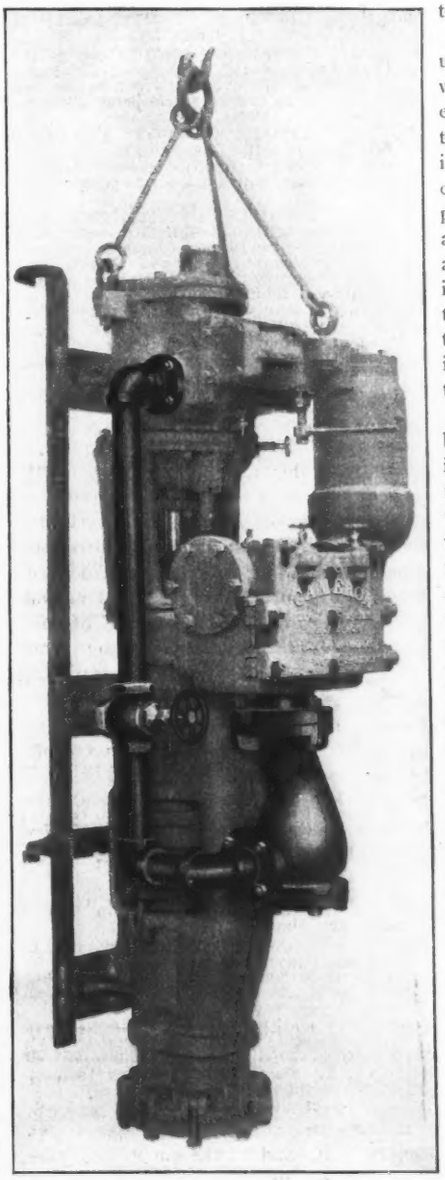

FIG. 1. SINKING PUMP WITH CONDENSER ATTACHED.

Fig. 1 shows a Cameron vertical plunger sinking pump, having the slings attached by which it is hung in the shaft. The darker portion shows the condenser, together with the exhaust pipe leading to it, directly bolted to the water valve chest; this makes a compact arrangement without offering resistance to the free inflow of water, and at the same time it takes care of the exhaust steam by condensing it; it enters the pump, as water, through the suction opening, and from it is discharged to the surface.

The condenser depends for its action upon the following: The constant flow of water through the suction piping connected to the bottom of the condenser cools the bronze sleeve which is arranged within this chamber; when the exhaust steam comes in contact with the cool surface, part of it will immediately be condensed, and the remainder, passing through the annular opening, will also be condensed in mixing with the water passing through the suction. This relieves the steam piston of back pressure, as a partial vacuum is formed, proportionate to the height of the suction lift.

It is necessary that the water cylinder be fully charged before the exhaust steam is turned into the condenser, by using the free exhaust until it has become filled with water; then the three-way valve may be turned and the exhaust steam admitted to the condenser. It should never be allowed to enter except in combination with the water. In some cases automatic floats are arranged to stop the pumps when the water supply is down. An air leak is as fatal to the successful working of this as of any other condensing apparatus, and therefore must be guarded against.

As the effective power of a steam pump depends on the initial steam pressure and the back pressure against which it is exhausting, the attachment of a condenser renders the machine more efficient, in the proportion in which the vacuum is maintained. The economy effected may not, on account of the exigencies of mine working, be commensurate with that shown by the condensing pump in stationary practice, but it will probably not fall far short of it.

A device of this character will probably find its field in mines where the added heat of the exhaust steam (if it is discharged into the shaft or mine itself) would render the temperature intolerable. Even where exhaust pipes are carried to the surface, the heat radiated from them is the source of considerable discomfort, aside from the investment required in piping. This latter question is enough, from the engineer's point of view, to justify the use of devices of this character. There is no apparent reason why considerable economy at the coal pile should not be shown by the use of such a condenser, it is simple enough to be operated

by the ordinary pump-man and might be applied, with advantage, to other classes of steam machinery where water is sufficiently abundant.

The saving in the cost of the exhaust piping, where it would otherwise be used, will in many cases more than offset the first cost of the condenser, and there are no joints or extensions to make in the exhaust line as the pump is moved from place to place.

Tin Mining in Bolivia.

According to a recent report of the British Foreign Office, since the rise in the price of tin the once famous silver mines of Oruro have depended for their prosperity more on their tin output than on the silver production. Bolivia is now one of the largest producers of tin in the world; half of its output coming from the Oruro district.

In 1904 the total shipments from the Oruro district amounted to the equivalent of 8,000 tons of metallic tin. In 1903 the output was about half as large.

Miners are scarce and wages have doubled in the last few years, and many kinds of labor-saving machinery and appliances have been introduced. A comparatively new tin-mining region in the "Tres Cruces" has been opened up by some enterprising Americans, with gratifying results.

The Antofagasta & Bolivia Railway Co. is considering the advisability of constructing branch lines connecting the various tin regions of the locality, and thus do away with the difficult and expensive transport of metals and goods by mule carts. At present the mines are from 6 to 30 miles from the railroad.

The carts to carry the production of the mines come from Chile, and the coaches from the United States. About 200 tons of mining steel are required annually, of which fully one-half is of British origin. The steel most suitable is said to be the ordinary British good-class mining steel, costing in the United Kingdom about £25 per ton. Modern steels, tempered with tungsten or molybdenum, have been sent, but they are too expensive except for high-speed drills. Furthermore, the native blacksmith does not know how to use them. Hammers, shovels and picks are mostly of German and North American manufacture, as are also hand-cars and steel rails. About 3,000 cases of dynamite are consumed yearly, half of which is of British origin.

Elevator and other cables used for hoisting purposes, are subject to both internal and external wear; the former is caused by the rubbing of the wires and strands upon one another under pressure in bending over the sheaves, the latter by rubbing and wedging in the grooves of the pulleys. Unless the cables are kept well lubricated they wear and deteriorate rapidly.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week ended Sept. 26, 1905.

800,130. PROCESS OF SEPARATING NICKEL FROM MATTES.—Robert H. Aiken, Winthrop Harbor, Ill.

800,148. SMELTING OR MELTING FURNACE.—Arthur B. Griffen, Verona, N. J.

800,181. METHOD OF PRODUCING ELECTRODES.—Heinrich Specketer, Griesheim-on-the-Main, Germany, assignor to the firm of Chemische Fabrik Griesheim Electron, Frankfort-on-the-Main, Germany.

800,187. APPARATUS FOR AERATING POLLUTED LIQUIDS.—William M. Venable, Cincinnati, Ohio, assignor to Sanitary Engineering Company, a corporation of New York.

800,218. PROCESS OF MAKING SULPHURIC ACID.—Rudolf Knietsch, Ludwigshafen-on-the-Rhine, Germany, assignor to Badische Anilin & Soda Fabrik, Ludwigshafen-on-the-Rhine, Germany, a corporation of Baden.

800,219. PROCESS FOR HEATING AND FIRING BOILERS BY MEANS OF OIL.—Ernst Koerting, Hanover, Germany.

800,222. FURNACE. — Meredith Leitch, Brooklyn, N. Y., assignor to Sheet Metal Recovery Company, a corporation of New Jersey.

800,223. TREATING TIN-SCRAP.—Meredith Leitch, Brooklyn, N. Y.

800,231. UNLOADING, STORING, AND RECLAIMING APPARATUS.—Lincoln Moss, New York, N. Y., assignor to Robins Conveying Belt Company, New York, N. Y., a corporation of New Jersey.

800,276. PROTECTOR FOR THE ROLLERS OF DREDGE-LADDERS, ETC.—Robert R. Douglas, Dunedin, New Zealand.

800,277. COMPRESSED-AIR WATER-ELEVATOR.—Augustus W. Drake, Lattimer Mines, Pa.

800,278. ROCK-CRUSHER.—John H. Elspass, Denver, Colo., assignor, by direct and mesne assignments, to the Samson Manufacturing Company, a corporation of Colorado.

800,287. APPARATUS FOR SOFTENING WATER.—Herbert S. Flynt, Sale, England.

800,293. CONCENTRATOR. — Snyder L. Hague, Salt Lake City, Utah.

800,370. MAGNETIC SEPARATOR.—Charles M. Green, Lynn, Mass., assignor to General Electric Company, a corporation of New York.

800,378. AMALGAMATOR.—Henry L. Lightner, San Francisco, Cal., assignor, by direct and mesne assignments, of one-third to William Priest and one-third to Henry Feige, San Francisco, Cal.

800,379. CONCENTRATOR.—Henry L. Lightner, San Francisco, Cal., assignor, by direct and mesne assignments, of one third to William Priest and one-third to Henry Feige, San Francisco, Cal.

800,380. PROCESS OF PRODUCING ALKALI AND ALKALINE-EARTH-METAL HYDRIDS.—Florentine J. Machalske, Brooklyn, N. Y., assignor to Frederick Darlington, Great Barrington, Mass.

800,398. SPLASH-PLATE FOR STAMP-MILLS.—George C. Richards, Oakand, Cal.

800,478. COAL-CUTTING MACHINE.—Charles O. Palmer, Cleveland, Ohio.

800,479. MINING-MACHINE.—Charles O. Palmer, Cleveland, Ohio.

800,480. MACHINE FOR GRADING SAND.—Charles W. Palmer, Philadelphia, Pa., assignor to Frank H. Caven and James Caven, Philadelphia, Pa., trading under the firm, style and title of James Caven & Son.

800,515. INCANDESCENT ELECTRICAL FURNACE.—Frank J. Tone, Niagara Falls, N. Y.

800,528. ORE WASHER AND CONCENTRATOR.—Nelson B. Winter, Cincinnati, Ohio.

800,588. ROASTING-FURNACE—August R. Meyer, Kansas City, Mo., assignor to the United Zinc & Chemical Company, Kansas City, Mo., a corporation of New Jersey.

Week ended Oct. 3, 1905.

800,622. UNLOADING AND CONVEYING APPARATUS.—Harry H. Bridgwater and Jonathan Haley, Akron, Ohio, assignors to the Akron Glass & Machinery Company, Akron, Ohio, a corporation of Ohio.

800,635. PROCESS OF TREATING LIME.—Carleton Ellis, Boston, Mass.

800,645. WARE-FEEDING APPARATUS FOR LEERS OR ANNEALING-FURNACES.—Jonathan Haley, Akron, Ohio, assignor to the Akron Glass & Machinery Company, Akron, Ohio, a corporation of Ohio.

800,698. PREPARING FINE PARTICLES OF OXIDE OF IRON FOR USE IN FURNACES.—Utley Wedge, Ardmore, Pa.

800,711. DUMPING-BUCKET.—Storrs M. Bishop and Jefferson L. Mitten, Wellsville, Ohio.

800,712. INGOT-STRIPPER.—John I. Blount, Donora, Pa., assignor to Whiting Foundry Equipment Company, Harvey, Ill., a corporation of Illinois.

800,781. DEVICE FOR HOLDING CHECKS UPON MINE-CARS.—James M. Wysor, Mannering, W. Va.

800,818. DUST-ARRESTER FOR PNEUMATIC DRILLS AND REAMERS.—Lee M. Parrett, Butte, Mont.

800,822. FUSE DEVICE.—Charles A. Rolfe, Adrian, Mich., assignor, by mesne assignments, to Rolfe Electric Company, Rochester, N. Y., a corporation of New York.

800,825. FUSE DEVICE.—Charles A. Rolfe, Adrian, Mich., assignor, by mesne assignments, to Rolfe Electric Company, Rochester, N. Y., a corporation of New York.

800,837. PROCESS OF MAKING THIN PLATE.—Daniel M. Somers, New York, N. Y.

800,838. MANUFACTURE OF STRATIFIED BLOCKS OF PLUMBAGO.—Charles W. Speirs, Battersea, London, England, assignor to the Morgan Crucible Company, Ltd., Battersea, London, England.

800,857. ELECTRIC FURNACE.—Fredrik A. Kjellin, Saltsjoebaden, Stockholm, Sweden.

800,910. HYDRAULIC ELEVATOR FOR DREDGING PURPOSES.—Benton Flood, Los Angeles, Cal.

800,920. MACHINE FOR OPERATING COAL-AUGERS.—John H. Huhn, Gypsy, W. Va.

800,936. DREDGER-BUCKET. — Timothy O'Leary, Oakland, Cal., assignor of one-half to Robert S. Moore, San Francisco, Cal.

800,950. ROLLING MECHANISM.—Daniel M. Somers, New York, N. Y.

800,952. PROCESS OF MAKING TIN-PLATE.—Daniel M. Somers, New York, N. Y.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week ended Sept. 23, 1905.

22,688 of 1904. UTILIZATION OF PEAT GAS.—E. T. Zohrab, London. Improvements in the inventor's process for using gases obtained by the distillation of peat for the purpose of reducing iron and other metals from their ores.

22,700 of 1904. BRIQUETTING MACHINE.—J. F. Pease, Darlington. Improvements in the mechanism of machines for making briquettes of iron ore, of the kind in which there are a succession of molds mounted on a circular frame and plungers to work into them.

24,445 of 1904. SLAG TREATMENT.—C. Witter, Hamburg, Germany. Improvements in treating tin slags. The inventor smelts the slags with lead ores, thus producing an alloy of tin and lead. This alloy is then oxidized so as to produce a mixture rich in tin, which is then returned to the tin smelter. By the use of lead, the iron and silica in the tin slag do not retain so much tin, and the eventual loss of tin is much decreased.

25,164 of 1904. BELT CONVEYOR.—A. W. Storey, Manchester. In openwork metal belts for conveying minerals, the provision of antifriction rollers on the links at the edges of the belts so as to decrease the friction.

8,521 of 1905. COMPRESSING PEAT.—A. M. Rosenthal, Stockholm, Sweden. Improved presses for treating peat, in which the peat is pressed into slabs between two plates.

12,005 of 1905. BALL MILL.—G. Commichau, Germany. In ball mills, arranging the mill at a high angle and providing each ball, which is of large size, with a deep groove.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Richard A. Parker, of Denver, Colo., was a recent visitor in Boston.

Mr. R. J. Grant has returned from Australia, and is again located in Denver, Colorado.

Mr. A. Chester Beatty returned to Denver a few days ago from a professional trip to Alaska.

Mr. W. Murdock Wiley, of the Mineral Development Co., started from New York for Mexico, Oct. 5, by a Ward Line steamer.

Major J. A. Currie, president and manager of the Imperial Steel & Wire Co., of Collingwood, Ont., has gone on a business trip to Pittsburg.

Mr. George G. Blackwell, chairman of George G. Blackwell, Sons & Co., Ltd., of Liverpool, England, is visiting this country on business.

Mr. J. J. Bennett, manager of the Douglas Mountain Mining & Tunnel Co., has gone to Columbus, Ohio, to meet with the new board of trustees.

Maj. A. B. De Saulles, superintendent of the So. Bethlehem zinc works, and daughter, Mrs. H. H. McClintic, of Pittsburg, have gone for a six weeks' visit to France.

Mr. D. W. Brunton is in the Cripple Creek district on professional work connected with the new drainage tunnel that is soon to be constructed by the mine-owners of that district.

Mr. G. D. Doveton, of Doveton & Purington, who has been examining Cripple Creek low-grade ores during the past six months, has completed his investigations and returned to Denver.

Prof. N. B. Carmichael and Mr. Manley Baker have been chosen to lecture in physics at the Kingston (Ont.) School of Mines this session, owing to the retirement of Prof. Marshall.

Messrs. J. T. McAninch and P. J. Meade, business men of Cleveland, and representing a Cleveland company, have gone to Farquhar county, Virginia, where they will investigate copper mines.

Mr. Frederick Thompson, of the Midvale Steel Co., Philadelphia, is making an extended tour through the western mining States, to secure data concerning wearing parts of mill and mining machinery.

Mr. R. D. Rhodes, former superintendent of the Murray, Utah, plant of the American Smelting & Refining Co., has accepted a like position with the United States Smelting Co., and will have charge of the Mammoth plant in Shasta county, California.

Mr. J. C. Squires, an experienced miner residing at Carterville, Mo., has returned from a trip through the zinc mining district of Arkansas. He spent considerable time at Harrison, Zinc and Yellville, and has decided to return to take up some interests.

Mr. George W. Maynard, of New York, has gone to Arizona and Sonora on professional business. His address for the present is Tucson, Ariz. Mr. Maynard has resigned his position as consulting engineer of the Guanacevi Tunnel Co., of Durango, Mexico.

Mr. William H. Hugus has tendered his resignation to the H. C. Frick Coke Co. as superintendent of the Davidson works. The resignation is to take effect Feb. 1, 1906. In various capacities Mr. Hugus has been in the employ of the H. C. Frick company since it started business.

Mr. O. B. Warren, of Hibbing, Minn., has been made superintendent of the Pearce mine, near that place, which is to be opened by the fee-owners. It was abandoned last year by the lessee, who had more than he was able then to handle. It will be mining in about a month.

Mr. Chas. A. Weller, representing Jos. S. Monday and others, accompanied by Jos. W. Moyer and Herman Kreis, are visiting Mexico. These gentlemen are going to look over the property of the Capuzaya Mining Co., which adjoins La Palmilla mine, in the Parral district.

Professor Dawbarn, lecturer in mining at the Ballarat, Victoria, School of Mines, has tendered his resignation in order to re-visit America. It is recognized that Professor Dawbarn is a most capable instructor, and the administrative council have asked him to reconsider the matter.

Messrs. Wales, vice-president of the Pittsburg Coal Co., Ferguson, director of the same company, and Hugh Sutherland, of the Canadian Northern Railway, recently inspected the Marks-Wiley iron properties in the Loon lake district, for the purchase of which the Mackenzie Mann Co. are negotiating.

Capt. S. Hoar, of Hibbing, Minn., is made superintendent of the work of Chisholm & Lynch, representing Jas. J. Hill, on Section 30-63-11, where a deep exploratory shaft is to be sunk. It is expected that this shaft will go down about 1,100 ft., and it will probably cut ore at 150 ft., but how long it can stay in ore is not known.

Professor Robert T. Hill delivered an interesting lecture on the Republic of Mexico at the American Museum of Natural History, New York, on Monday evening, Oct. 9. The lecture was under the auspices of the section of geology and mineralogy of the New York Academy of Sciences. The lecturer dwelt more particularly upon the physical and economical aspects of the Republic.

Messrs. E. F. Bradt and Geo. W. Wallace, formerly of Duluth, but now respectively manager and contractor for the Independent Salt Co., that is sinking a 6 by 16-ft. shaft 1,100 ft. deep at Detroit, Mich., are in Duluth. Mr. Bradt has just been elected a director for the Vermillion Range Iron & Land Co., owning vacant lands on that range and the Mesabi, and is inspecting these holdings. The shaft they are sinking at Detroit has been under way 10 months, and is down 100 ft. It has been one of the most serious problems that ever confronted a mining engineer, and will continue such for many hundred feet more. It is hoped to have it bottomed in something over two years from this date.

Obituary.

Captain Josiah Hall, one of the pioneer mining men of the Michigan copper district, died Oct. 4, of old age.

P. A. H. Franklin, of Salt Lake City, Utah, died recently. He was prominently engaged in mining in Utah, especially in the Bingham district, 10 or 15 years ago.

Captain Harry Merry, one of Lake Superior's first mining men, died on Sept. 24 at the family home in Cleveland. It was reported in Cleveland a few days previously that he was recovering from the effects of an operation made necessary by blood poisoning, performed three weeks ago. Captain Merry opened the Jackson mine and spent over 35 years at the property. He left Negaunee 18 years ago last spring, locating in the South, later moving to Cleveland to spend the remainder of his days. He was 75 years of age and is survived by his widow, two sons and two daughters.

Stephen Pierce, a mining man of wide experience, both in the United States and in Mexico, died in Oaxaca Sept. 10. Stephen Pierce was born in Leavenworth, Kansas, 43 years ago. In 1875 he moved to Great Falls, Mont., and became interested in mining. About 20 years ago he became associated with Philip T. Walsh in mining business, and their interests were mutual up to the time of Mr. Pierce's death. A year and a half ago he purchased an interest in the Boston & Oaxaca Mining Co., of Boston, of which company R. H. Barnes, of Boston, is president, Mr. Pierce being one of the directors. He was interested also in many other mining companies of Mexico.

James M. Hagerty, of Mansfield, Ohio, a pioneer of Okanogan county, Washington, died at Spokane, Wash., Sept. 22, of cerebral meningitis. He was born at Akron, Ind., March 4, 1864. His remains were taken to Nighthawk and interred on little Mount Chapaca, overlooking the beautiful valley of the Similkameen river, near the scenes of his mining operations. Mr. Hagerty was prominent in late years in Okanogan county as a mine and industrial operator and promotor and was successful in drawing a large amount of eastern capital to his enterprises. He was

president of the Similkameen Falls Power & Development Co.; also of the Ruby and Six Eagles mining companies. His death is regarded as a serious loss in the neighborhood of his operations.

By the demise of John F. Dravo at Beaver, Pa., on Saturday, Sept. 30, Pittsburg lost one of its noted men and inland navigation its dean. Capt. Dravo was 85 years of age, and was actively engaged in business until a few months before his death. He was born at West Newton, Pa., Oct. 29, 1819, and was educated in the common schools and at Allegheny College, Meadville. For a few years he engaged in teaching, afterward he learned the details of the coal business in his father's office, and in 1845 embarked in the coal business for himself. In 1854 he founded the town of Dravosburg, Pa., now a flourishing mining center, and while actively engaged in coal mining, he early saw the possibilities of improved navigation on the Monongahela and Ohio rivers. In 1868 he organized the Pittsburg & Connellsville Gas, Coal & Coke Co., becoming its general manager and treasurer. This company began with 40 ovens, and when Dravo retired from the presidency in 1883, it was operating 400 ovens. In 1876 Capt. Dravo was elected president of the Pittsburg Coal Exchange, which position he held continuously for 10 years. He was active in securing the organization of the Pittsburg Chamber of Commerce, was one of its charter members and for several years its president.

Societies and Technical Schools.

Franklin Institute.—At the stated meeting in Philadelphia, Oct. 12, Mr. Lawrence Addicks, of Perth Amboy, N. J., read a paper on "Electrolytic Copper."

American Institute of Mining Engineers.—A circular just issued from the secretary's office in New York says: "The nineteenth meeting of the Institute, for the reading and discussion of papers, will be held at Lehigh University, South Bethlehem, Pa., beginning Wednesday, Feb. 21, 1906. Further particulars will be given by circular hereafter.

"The council of the Iron & Steel Institute has cordially invited the American Institute of Mining Engineers to hold in England, during the autumn of 1906, a joint meeting, consisting of sessions in London, followed by excursions to the provinces. This invitation has been accepted by our council. It is understood that the meeting will take place in August or September, but the precise date has been left open for early determination after further conference. Particulars concerning this and other features of the meeting will be given in a later circular. This brief preliminary announcement is issued in order that members may have as long a time as possible to make such arrangements for next year as will permit their attendance."

Trade Catalogues.

I. Weil, Pittsburg, Pa., sends us his 4-page leaflet on the "Weil System of Endless Rope Haulage."

The Hart-Parr Co., Charles City, Ia., sends us its catalogue of gasoline engines for pumping and traction. The catalogue is standard size.

The Continental Car & Equipment Co., St. Louis, Mo., has issued its new catalogue of dump cars. This is well illustrated and of standard size.

The Laidlaw-Dunn-Gordon Co., Cincinnati, O., sends us its bulletin L-508, describing the improved Cincinnati air compressor. It is of standard size, well written and profusely illustrated.

The catalogue of Charging and Manipulating Apparatus for iron and steel works, issued by the Wellman-Seaver-Morgan Co., Cleveland, O., is of the standard 9 by 12-in. size, finely illustrated and filled with well written descriptive matter.

We have the elaborate and finely bound catalogue of the Brown Hoisting Machinery Co., Cleveland, O. This is a volume of 200 pages, 9 by 12 in. in size, and full of the finest half-tone illustrations. The descriptive matter is clear and well written, and the entire publication is entitled to rank as a treatise upon the economic handling of material.

Industrial.

The exhibit of the Broderick & Bascom Rope Co. at the Portland Fair is receiving much favorable comment. The main office is at St. Louis, Missouri.

The Westinghouse Machine Co. reports orders during the past month for 51 mechanical stokers of the Roney type, the largest order being that of the Pennsylvania railroad for 11 stokers.

The Standard Machinery & Supply Co. is a new corporation, organized to handle mining and other machinery on the Pacific coast. Its office is at 427 Mission street, San Francisco. The company requests catalogues from manufacturers.

Among the orders received by the Ernst Wiener Co. during the last month was one from a Central American railroad for 30 narrow-gauge platform cars. These cars will have general dimensions as follows: Length, 30 ft.; width, 8 ft.; gauge, 3 ft. 8 in.; diameter of wheels, 24 in. They will be fittted with diamond trucks.

The Crocker-Wheeler Co. reports an order for a 200-kw., three-phase, 60-cycle, engine-type A. C. generator for the Ivorydale, Ohio, lighting and power plant of the Proctor & Gamble Co. This machine is a duplicate of the first Crocker-Wheeler alternater ever built, which was installed ten months ago in the Atlanta plant of the same company.

The Marine Manufacturing & Supply Co., New York City, is moving its manufacturing department to New Brunswick, N. J. The new plant occupies the larger part of a city block, and includes iron and brass foundry, machine shop, blacksmith and pattern shops, etc. They make steering wheels, windlasses, hoisting winches, crabs, derrick fittings and a complete line of shipbuilders' and contractors' supplies.

The Abner Doble Co., of San Francisco, announces that the University of Michigan has purchased the tangential waterwheel which it exhibited at the St. Louis World's Fair, and for which the company was awarded the Grand Prize. This wheel is to be installed in the hydraulic laboratory of the new engineering building at Ann Arbor, Mich., where it will be mounted in connection with a duplex pump for experimental purposes, its output being 100 h.p. when operating under a head of 580 ft. Orders have recently been received from the University of Wisconsin, the Michigan School of Mines and the University of Toronto for wheels of this type.

The Bury Compressor Co., successor to Herron & Bury Manufacturing Co., of Erie, Pa., report business brisk in the mining districts of the Southwest and West. Among recent sales in Colorado secured through its Denver representative, H. L. Sinclair, are the following steam, belt and motor-driven machines in varying capacities: Waldorf Mines Co., Silver Plume; West Gold Hill Mining Co., Tin Cup; Firemen & Conductors Mining Co., Dumont; Fostoria Gold Mining Co., Idaho Springs; Imperial Gold Mining Co., Apex; Allen Park Prospecting & Development Co., Lyons; Tornado Mining Co., Del Norte. Sales were also made to the Bonney Mining Co., Lordsburg, N. M., and the German-American Mining Co., Osborne, Idaho.

The Power & Mining Machinery Co., Cudahy, Wis., has recently secured some large contracts for mining machinery. Some of the most prominent are: Shannon Copper Co., Clifton, Ariz., complete converter plant, including four 7 by 10-in. hydraulic converters of new design. This plant, when complete, will be one of the most modern in the country. All of the machinery is of the best improved type, and is built extra strong. Every precaution has been taken to avoid accidents common to plants of this character. Colusa-Parrot Mining & Smelting Co., Butte, Mont., six 7 by 10-in. new and modern design, electrically-driven converters. American Smelting & Refining Co., new Garfield plant, near Salt Lake City, twelve 8 by 10 in. hydraulic converters of the same type as the Shannon and Colusa-Parrot. American Smelting & Refining

Co., Aguas Calientes, Mexico plant, three 8 by 17-in. vertical copper converters. Old Hundred mines, near Silverton, Col., complete 40-stamp mill, electrically driven.

It is stated on good authority that Mr. William J. Chalmers, who was until Sept. 7 last vice-president and treasurer and also a director of the Allis-Chalmers Co. since its organization, has resigned as director, and that he has sold all of the shares of stock held by him, so that he is therefore no longer connected with the company.

Construction News.

Birmingham, Alabama.—The Sloss-Sheffield Steel & Iron Co., it is reported, has decided to build steel works at North Birmingham.

Opelousas, Louisiana.—The Pelican Oil & Mineral Co., Ltd., $50,000 capital stock, will operate for oil, sulphur, salt and other mineral substances.

Cananea, Sonora, Mexico.—The Queen Gold Mining Co. is preparing to develop its mining properties near Cananea, Sonora. I. D. Reedy is president.

Atlanta, Georgia.—The Atlanta Structural Steel Co. is in the market for a centrifugal pump to discharge 700 gal. of water per minute, against 150-ft. head.

Davis, Indian Territory.—R. W. Rayel has discovered a 3-ft. seam of high-grade steam coal on his property, and arrangements will be made for its development.

Gravette, Arkansas.—The Ozark White Lime Co. is reported to have purchased 100 acres more of limestone land, and will erect two more kilns. A. W. Morris is manager.

Loomis, Okanogan County, Washington.—The Douglas Mountain Mining & Tunnel Co. is considering the equipment of its property with an air-compressor, drills and electrical machinery.

Roanoke, Virginia.—The Roanoke Stone & Lime Co. has incorporated with an authorized capital stock of $10,000 to quarry rock, etc. O. A. Kerns is president; A. D. W. Walton, secretary-treasurer.

St. Louis, Missouri.—The E. S. Smelting, Refining & Manufacturing Co. has been incorporated, with $100,000 capital stock, by Charles A. Niel, Albert C. Trebus and Charles Leman, and will build works.

Caborca, Sonora, Mexico.—The Arizona-Mexican Copper Co., of this place, will build a smelting plant of 100 tons capacity to cost about $100,000. J. E. Hubinger, of Denver, Col., is reported to be president.

Caribou, Colorado.—In order to handle the increased tonnage, in consequence of having completed a large tunnel on the Boulder County mine, near Caribou, Col., the company expects to erect a larger mill before long.

Cable, Granite County, Montana.—W. D. Bohm is about to construct a new 40-ton mill and aërial train for the Golden Eagle Mining Co., on Cable mountain. He will also construct a considerable permanent camp.

Beaumont, Texas.—J. C. Wilson, H. I. Adset, of Beaumont; G. W. Meyer, E. B. McRaven, W. E. Broach and B. J. Carter, of Meridian, Miss., have incorporated the Owasco Oil Co., with $15,000 capital stock, to drill for oil.

Arkwright, South Carolina.—It is reported that G. C. Page, of Landrum, S. C., and L. G. P. Carruth, of Spartanburg, S. C., have discovered asbestos deposits on property which they own near Arkwright, and will probably develop same.

Whitehall, Maryland.—The Maryland Investment Co. has been incorporated with $150,000 capital stock by William H. Green, Winfield S. McComas, Edgar F. Dobson, James M. Seitz and William C. Korb, to deal in land, operate quarries, etc.

Barboursville, Kentucky.—John G. Matthews, president of the First National Bank, is arranging for the development of coal properties in Knox county, and is reported to intend building a $30,000 mining plant to have a daily output of 500 tons.

Macon, Georgia.—The Redding Graphite Co. has been organized, with Thomas R. Ayer, president, and W. A. Redding, general manager, both of this place, to develop extensive graphite deposits in Clay county, Alabama. About $25,000 will be invested.

Shawnee, Oklahoma Territory.—The Shawnee Copper Mining Co., with $1,000,000 capital stock, has been incorporated by J. S. Ware, A. M. Coffin, Charles A. Miles, Frank E. Fayerquist, of Shawnee, and James H. Kyner, of Bladensburg, Md., to mine copper.

Parral, Chihuahua, Mexico.—The Veta Colorada Mining & Smelting Co., of this place, will build a 500-ton cyanide plant here. J. N. A. Connor, recently with the American-Mexico Mining & Developing Co., of San Lorenzo, Chihuahua, has been engaged as superintendent.

Oklahoma City, Oklahoma Territory.—The United States Furnace Co., of this place and Chicago, Ill., has been incorporated, with $500,000 capital stock, by A. J. McMahon, L. V. McRae, of this place, James Murphy, Guy S. White and W. A. Rogers, of Chicago, Illinois.

Salisbury, North Carolina.—The Dunn Mountain Granite Co. has been incorporated, with $20,000 capital stock, by J. C. McCanless, W. F. Snider, L. H. Clement and P. H. Thompson. The company will operate granite quarries on the William T. Buckley estate, which has been purchased.

Oklahoma City, Oklahoma Territory.—Incorporated: The Pioneer Oil & Mining Co., with $250,000 capital stock, by Charles J. Carman, James H. Smith, of Charley, O. T.; Stephen Brown, of Rush Springs, I. T.; Herman C. Whipperman and Richard O. Whipperman, of Grand Rapids, Wisconsin.

Guanajuato, Jalisco, Mexico. — The Guanajuato River Mining Co. is preparing to instal centrifugal pumps, jigs and concentrators and other modern machinery to facilitate developments of its mining properties. George W. Bryant and George H. McIlhenney, of this place are managing the work proposed.

Montgomery, Alabama.—The Alabama Copper Co. has begun the erection of plant for the extraction of copper, gold and silver from copper pyrites; monthly capacacity 50,000 pounds of copper. A. B. Rains, of Columbia, Tenn., is superintending the construction.

Big Fork, Arkansas.—The Lone Star Slate & Mining Co. has been organized. A. M. McElwee, of Fort Worth, Texas, is president, and E. A. Brennan, of Mena, Ark., secretary. The capital stock is $240,000. The company owns 160 acres of land containing slate deposits, and arrangements will be made for quarrying and for erecting a mill.

Holden, West Virginia.—The United States Coal & Oil Co., of Boston, Mass., is reported to have purchased property on which to erect coal tipples. It is also proposed to build a line of barges for the transportation of its product from coal mines, at this place, to the Southern markets. About $500,000 will be expended. It is stated that the company will also arrange for opening new mines.

Crossville, Tennessee.—The Weaver Coal & Coke Co. has been chartered with a capital of $1,000,000 paid in. Henry E. Weaver, of Chicago, is president of the company, J. C. Van Blarcom, of St. Louis, is vice-president, and William Ramsey, of Chicago, is general manager. Near this place the company will erect a coke plant at a cost of $100,000. A line of railroad, seven miles long, will be built from the mines to Crossville.

Tuscaloosa, Alabama.—W. H. Skaggs, of Birmingham, Ala.; Wm. P. Nixon, of Chicago, Ill., and other capitalists intend taking up coal-mining development near Tuscaloosa. They control 41,000 acres of land on the Warrior river, above Tuscaloosa, and the Mobile & Ohio railway is considering the construction of an extension into the property. It is planned to supply the local demands of manufacturers, and to furnish coal for export.

Special Correspondence.

San Francisco. Oct. 4.

Some of the "watchmen"—or, the miners call them, "spies"—of the State Anti-Débris Association have been charged with attempted blackmail on hydraulic miners, and the accused men will doubtless be shortly tried in the courts. The charges are brought by Captain W. W. Harts, the secretary of the California Débris Association and a member of that body. The charge comes originally from certain hydraulic miners who have filed affidavits with the Débris Commission. They allege that they were approached by these "watchmen" and asked to pay $500, and on payment of that sum would be protected against injunction proceedings in case of any violation of the Caminetti law. If the money was not paid these watchmen would report to the Anti-Débris Association and the mines would be closed down. On compliance with the demand, however, the miners would be permitted to work their hydraulic mines whether they built impounding dams or not, or whether they obtained a Federal license or not.

It has long been understood that affairs of this kind were going on, but it has heretofore been impossible to fix upon the individual men who were doing the business.

Captain Harts brought this matter before the California Miners' Association some weeks ago, suppressing only the names. The Association appointed a committee to see under what laws the blackmailers might be punished. The Débris Commission had no authority to bring such suits, and it was doubtful under what law suits might be brought. As the Miners' Association did not act promptly, the secretary of the Débris Commission brought the matter to the attention of the Anti-Débris Association, that it might itself punish its agents and clear its own skirts if possible. The watchmen have been suspended, pending further investigation.

It is a good thing for the hydraulic miners that this matter has been made public, even if no punishment follows. The watchmen deny the alleged blackmailing, but on the other hand the miners have sworn to the statements made. The evil is one that has doubtless existed for a long time. The evidence gathered by Captain Harts will be delivered to whoever will prosecute the case, and probably this will be the California Miners' Association, which has for 10 years been fighting in the interest of the hydraulic miners of the State.

The Oroville and Bear river dredging properties sold recently by W. P. Hammon and associates to the Oroville Dredging, Ltd., include 3,000 acres of proven ground, of which 300 have been mined, and eight dredges in operation and two in course of construction. Mr. Hammon and associates control properties along the Yuba river, between Marysville and Smartsville, equal in extent to the entire Oroville district, and operate under the name of the Yuba Consolidated Gold Fields. The ground there is much deeper than at Oroville, and more easily worked, having less gravel and boulders. At this point they have two large dredges at work and are building six more. Nos. 1 and 2, both at work, are Bucyrus machines of 3,000 cu. yd. capacity at 70 ft. depth. Nos. 3 to 8 are of the Marion steam-shovel type. These new machines are to dig to a depth of 75 ft. and are of 3,000 yd. daily capacity. The buckets are 5 ft., with 93 on each chain. Rotary screens are to be used on the new machines. No. 5 will be at work this month, and Nos. 3, 4 and 6 by November; while Nos. 7 and 8 will not be ready before Dec. 1. The hulls of the dredges are finished and the machinery is being installed. W. P. Hammon is general manager. In the same field—the Yuba—the Marysville Gold Dredging Co. is building two large dredges, one of which will be completed Dec. 1, and the other Jan. 1. They have capacities of 2,500 yd. at 75 ft. depth. They are of the Hammon type, and are being built by the Marion Steam Shovel Co.

The Oroville Gold Dredging & Exploration Co., of which Fred W. Bradley was formerly president, has sued that gentleman for an accounting of all his acts as chief officer of the corporation from March, 1901, to April, 1905. It is alleged that he caused a loss to the company of some $900,000 by waiving an option on certain Yuba county dredging lands. The trial of this case will be an interesting one and will bring out the details of the quarrel between Mr. Bradley, John Hays Hammond, the late J. G. Doolittle and others.

The White Knob Copper Development Co., of New York, has become the owner of the Balakalala group of copper, gold and silver mines near Kennett, Shasta county, the published price being $2,000,000. These mines belonged to the estate of Peter Kimberly, of Chicago, and are considered valuable properties. The new owners intend to push the development rapidly, and equip the property with a large smelter. An old mine called the Winthrop, at Copper City, in the same county, is being reopened by the Bully Hill Mining Co., with the expectation of finding valuable bodies of copper ore. The old tramway will be reconstructed so that ores may be brought from Copper City to the smelter at De Lamar. The Winthrop was worked for gold and silver many years ago, and a great chlorination plant was at one time in operation. The starting of the Mammoth smelter at Kennett adds another extensive copper reduction plant to those already in operation in Shasta county.

Now that the Guggenheims have obtained control of the Dairy Farm mine in Placer county, doubtless the copper deposits at that point will be more extensively developed. The shaft is to be sunk deeper as rapidly as possible and active work will be continued all winter. The South Yuba Mining & Smelting Co. has sold outright its copper property near French Corral, Nevada county, to San Francisco men. A smelter will be erected on the ground, unless a proposed electric road is build to Lincoln, Placer county, where a smelter is already planned. No. 6 tunnel will be driven rapidly ahead to determine the size of the body of copper ore and 1,000 tons of ore will be shipped for test purposes to the Selby smelter. A. Ellinger is president of the new company, S. A. Hieronomous, vice-president, J. P. Maleville, secretary, and O. Woehler, general manager. The offices of the company are in Grass Valley.

The Chinatown of Weaverville, Trinity county, has been burned out, and the citizens are trying to prevent its being rebuilt. Weaverville has the distinction of having the largest Chinese population of any of the interior towns of the State. The gravel mines in that section employ Chinese miners almost exclusively, and hundreds of Chinese are also working on their own account.

The striking of a wide vein in the already profitable Lightner mines, at Angels, Calaveras county, is taken to prove that the rich ore-shoot worked above continues down as far as the 700-ft. level at least The mine is now profitable, paying regular dividends. For some years the expenses equaled the output, until the present manager, Alex. Chalmers, took hold and applied ordinary business principles to the operations. He was not an expert miner, and did not pretend to be, but he made a paying mine out of one that was unprofitable.

Goldfield, Nev. Sept. 25.

The completion of the Tonopah-Goldfield railroad has given a great impetus to mining and prospecting operations on the various fields in southern Nevada. It has undoubtedly proved a boon to the Goldfield district, and is enabling many low-grade miners to secure profitable returns from ore that previously was valueless, on account of the high shipment charges. At the present time 23 mines are sending ore to the smelters at Reno, in northern Nevada, and Bingham, Utah, and the list will shortly be enlarged.

The lessees on the Florence recently shipped 22 carloads of ore averaging $300 per ton. The Reilly lease on this mine, which will expire on November 19, will have yielded by that time ore valued at $750,000.

A rich strike has been made in the 100-ft. level in the Red Top mine. There are large bodies of ore developed in this property, and it will shortly commence to be a regular shipper. Recent developments in the 350-ft. level in the Jumbo are also of a promising nature.

The eastern part of Goldfield is attracting attention, and development operations on claims east of the Atalanta, Lone Star and Simmerone mines are being followed with interest. The geological conditions are favorable for the occurrence of gold, and some of the low-grade veins now being prospected may rapidly improve in value, as similar orebodies did in the central districts.

The Atalanta mine has been let in 18 distinct leases, and is being developed systematically. Ore of shipping grade has been opened up in several places. It is believed that the vein system is connected with the Jumbo, Combination and Florence system, and the property promises to develop into a steady producer of medium-grade ore. Already assays up to $100 per ton have been obtained from some of the workings.

Salt Lake City. Oct. 4.

The month of September has closed as a record breaker for the Cactus mine, owned by the Newhouse Mines & Smelters Corporation, in Beaver county. A total of 50 cars of concentrate, or about 2,500 tons, were marketed.

Ground has been broken for the proposed 2,500-ton milling plant of the Utah Copper Co., notwithstanding the pending litigation brought by the vice-president of the company, Col. E. A. Wall, to enjoin the majority shareholders from increasing the capital stock and carrying out the plan of financing the company, outlined some time ago. It is expected the excavations and concrete work will be completed within 60 days.

At the annual meeting of the stockholders of the West Quincy Mining Co., C. D. B. Turner was elected president; J. H. Moyle, vice-president; R. E. Miller, secretary; Sherman Fargo, treasurer, all of Salt Lake. These, with J. H. Rand, of Chicago; Dr. E. V. Van Norman, of Los Angeles, and W. H. Dodge, of Salt Lake, constitute the board of directors. Important developments have been made during the year in the property of the company, which is located at Park City. The property is about to go upon a producing basis. The most important strike of the year in Park City has been made in this property.

The Centennial Emma property, one of the old-time producers of the camp of Alta, which has been idle for a number of years, has been bonded to a Chicago syndicate for a consideration of $75,000.

The new tramway of the Bingham-New Haven Mining Co., at Bingham, is almost completed and will be ready for commission within the next 10 days. The line is about a mile in length and will connect the mine with a loading station on the Copper Belt railroad, near the Highland Boy mine.

The New Red Wing Mining Co., of Bingham, is having some of its low-grade ore treated at a custom mill in Bingham, and is handling in this way an average of 60 tons a day.

The work of pushing the Honerine tunnel to a connection with the workings of the Honerine mine at Stockton is progressing very satisfactorily. The tunnel has reached a length of 9,500 ft. in all.

The construction of the copper smelter of the American Smelting & Refining Co. is progressing at a rapid rate and every effort is being put forth to have the big plant ready for commission early in the coming year.

Spokane. Oct. 2.

The First Thought mine on Kettle river, near Orient, Wash., is shipping about 30 tons of ore daily to the smelters. The Copper Butte, a property near the First Thought and owned by Indiana people, is being developed. Reports from the Globe say that the vein has been struck.

One of the curious phases of mining in Oregon is found among the farmers around Grant's Pass and Medford, near the California line. Nearly every ranch has a little placer ground, which is worked spasmodically during the winter when water is plentiful, and the placer gold crop compares favorably with the yield of wheat or apples. It is mining of the most primitive sort, and it is varied by "pocket mining." The farmers go out gophering on the quartz lodes for rich pockets, and it frequently happens that a single seam of free gold will contain several hundred dollars.

The discovery of the You Like vein in the No. 6 level of the Morning mine at Mullan, Idaho, gives a good outlook for that Larson & Greenough lead-producer. The strike is made 1,000 ft. below No. 5 tunnel. The vein is 15 ft. wide and contains a considerable quantity of shipping ore. The discovery is at a point 8,000 or 9,000 ft. from the portal and at a depth of 2,200 ft. The tunnel will be continued for 1,000 ft. to strike the Morning vein.

The Snowstorm, a property at Mullan, Idaho, is working 100 men and is shipping 300 tons daily to smelters in Montana, Washington and British Columbia. Owing to the non-arrival of material, the leaching plant has not been completed.

The Spokane Pottery works have recently completed the largest plant in the Northwest at Clayton, a few miles north of Spokane. It has a capacity of a million gallons of coarse pottery a year, and the flower-pot section can make 10,000 pots in 10 hours. E. K. Erwin, F. C. Loring, F. H. Oliver, Andrew Laidlaw and J. O. Hankins are interested.

Under the recently enacted mine-taxation law of Idaho, which seems to be quite satisfactory both to the mining companies and to the counties, the county taxes paid by the mines in Shoshone county, Idaho, covering the Cœur d'Alenes, will reach $114,304 for 1905. The Federal Mining & Smelting Co. pays $43,844; the Bunker Hill & Sullivan, $32,910; the Hercules, $14,217; the Morning mine, $9,636; the Hecla, $7,614. The county tax is $3 per $100. The mines pay taxes on improvements, and on net profits for the year. Net profits reported by various properties were: Federal, $1,169,036; Bunker Hill & Sullivan, $938,868; Hercules, $430,419; Morning, $146,025; Hecla, $207,511. The taxes quoted above do not include special school taxes, which in some districts are a considerable sum. Total net profits were reported for taxation at $2,951,811, and $859,333 for improvements.

P. Clark, one of the best known mining men in the Northwest, is backing the Furnace Creek Copper Co., recently formed with a capital of $1,250,000 to handle the recently discovered copper properties in the Furnace Creek range, in Death Valley, California.

Denver. Oct. 6.

The principal event of the week was the laying of the cornerstone of Guggenheim Hall, on the grounds of the State School of Mines, in the presence of the State officials and a number of the most prominent men of this city, who appreciated the gift of $75,000 to an institution which, after struggling along since 1879, on account of continued small appropriations on the part of the State legislatures, has progressed to its present high standing. Its present capacity is about 300 students. Speeches were made by Governor McDonald, Congressman Bonynge and Simon Guggenheim, the donor, and after the ceremony, which was directed by the Grand Lodge of Masons, a lunch was served at Stratton Hall, the gift of the late W. S. Stratton, a couple of years ago.

For some time past, the Dupont Powder Co. has been looking for a location for a manufacturing plant, and a tract of land for that purpose has just been purchased near Littleton, about 10 miles distant from this city. It will be one of the principal additions to Denver's industries during the past few years as a large number of men will be employed.

During the month of September, gold to the amount of $2,272,818 and silver amounting to $4,742 was received at the branch mint, contributed principally by Colorado, while Utah, Wyoming, New Mexico and Arizona are credited with small amounts. The date when coinage will commence is not definitely settled yet, there being considerable delay in the arrival of the needed machinery.

It is stated on reliable authority that some excellent gold-copper ores have been

found near Long's Peak, northwest of Boulder, and that some prominent mining men will furnish the means for developing the new camp.

The prospects of the Cripple Creek district for this month are high, and it looks as if the two million mark will be reached in October. The output for September was $1,846,300 produced from 57,340 tons of ore. The Portland Gold Mining Co. expects to distribute $300,000 among its stockholders this month, being the regular quarterly dividend of 6c. per share, besides an extra 4 cents.

The large drainage tunnel, which it is contemplated to build in the Cripple Creek district, is a probability. By request of the mine-owners, D. W. Brunton has just completed a report, which will be submitted in a few days and there is considerable talk of its being used for transportation purposes also, in connection with the building of another railroad, one system virtually controlling all the transportation facilities in and from the whole district at present.

The building of an electric railroad from Cañon City to the district is also being considered, in connection with the construction of a wagon road for which $10,000 was appropriated by the last legislature.

In consequence of a much larger output of the steel works at Pueblo and a considerable reduction of the operating expenses, the earnings of the Colorado Fuel & Iron Co. will be largely in excess of those of the previous fiscal year. It is expected that George Gould will be here personally to attend the annual meeting, which is to be held Oct. 16. No change in the directory is expected.

News has been received here of the assassination of William V. O'Daly, a mining engineer, by a Mexican, near Fuerte, Sinaloa, Mexico. The murderer was captured.

Although working for different ends, the engineers of the Denver, Northwestern & Pacific railroad and those of the United States Geological Survey, are both completing the survey now being made of Gore Cañon. Charles D. Walcott, director of the United States Geological Survey, lately visited the scene of operations and then left for St. Louis.

Duluth. Sept. 28.

Electric tramming outfits are to be put into the Queen group and Hartford mines at Negaunee and the Fayal at Eveleth, on the Mesabi range. While the details of these plants have not been settled, it is probable they will consist of 100-kw. generators, and each will have four locomotives. The Fayal system will connect all the underground workings with the new No. 4 shaft, which will hereafter be the chief avenue of the mine, and the other shafts which were sunk in ore, will gradually be mined out and wrecked.

Genoa mine, of the Mesabi range, is sinking a new shaft and will increase its product the coming year.

Ore of an inferior quality has been struck in the Shenango Furnace Co.'s operation on the so-called Deerwood range, west of here. It is much similar to that which has been cut by the shaft on the Pickands, Mather & Co. exploration, a lean silicious hard ore, suitable for nothing but foundry purpose, if for that.

A complete underground electric tramming system is to be installed at the Iroquois mine, Mesabi range, which is operated by the Iroquois Furnace Co., of Chicago. This mine is a milling property, and is a large shipper this year for the first time.

Probable shipments for 1906 are requiring immense purchases of material and equipment. The Oliver Iron Mining Co. alone will probably buy more than $1,000,000 worth of mining equipment, and the western end has recommended as much. This will include steam shovels in such number that no single manufacturer will be able to deliver them on time. It will also include more than 60 standard-gauge steam locomotives, for stripping and handling ore at surface mines. Several hundred thousand dollars will be spent in equipping new mines on the western Mesabi. Fully a million dollars will be spent by independent mining companies, or those controlled by other steel-making concerns, for steam and electrical equipment, and if the general substitution of electricity for steam that is expected should begin this season the total expenditures will far exceed what has been figured above.

Ore shipments for September, which will be figured out in a few days, cannot be within a million tons of the high point of the season and will make the year's total about 25,000,000. This is 3,500,000 tons more than all last year, however, and here are still two months to be heard from. Business is expected to continue to December.

Trammers at the Richmond mine, Cascade, have struck for an advance of 25c. a day, to $2, and the mine has been closed down for the present. The company offered to advance 15c. a day.

Shipments amounting to 8,000 tons a day have been coming out of the Oliver Co.'s Stephens mine the past few days. This is far ahead of anything the mine has ever done. It is practically a new property, and this is its first year of heavy business. It is a steam-shovel mine, and is a very large property, containing many million tons.

All stocked ore has been shipped from the Chandler mine, at Ely, and the Pioneer, of the same place, will be through with its stocks this week. These are the chief shippers of the Vermillion range.

Calumet, Mich. Oct. 7.

An important conference between the various railway interests in Keweenaw county was held a few days ago. That action of vital interest to the mining welfare of the northeasterly portion of the Lake Superior copper district was taken, is evident by the revival of activity in railway affairs on Keweenaw peninsula. C. A. Wright, president of the newly formed Keneenaw Central Railway Co., has returned to the Lake district after consulting the Eastern men interested in the road. Mr. Wright refused to be quoted. It is known, however, that a contract has been let for the construction of the division of the road between the Cliff and Mohawk mines. Frank Buschell, of Lake Linden, has the work and will put a force of men on the 12 miles of road immediately. The grading will be rushed with all possible speed, as it is desired to have the rails laid before winter weather arrives. The Keweenaw Central has purchased a locomotive from the Copper Range railroad and it will be taken to Lac La Belle on scows. The engine will be used in construction work until the road is ready to go into operation.

That a settlement of the differences between the Keweenaw Central road and the Tamarack Mining Co., which owns the Cliff, has been effected, is evident by the letting of a contract for the construction of the road beyond that point. G. M. Hyams, of Boston, representing the Bigelow syndicate, which controls the Tamarack, was at the recent conference. The Keweenaw Central instituted condemnation proceedings, but they will be unnecessary now.

President Fitch, accompanied by a party of leading officials of the Duluth, South Shore & Atlantic, which controls the Mineral Range, went over that road to Mohawk this week. The South Shore surveyors, who were sent to Keweenaw county several days ago, are still at work there. An official of the South Shore says the extension is positively to be built as rapidly as the work can be carried to completion. He says the Tamarack Mining Co., a minority stockholder in the Mineral Range, asked to have the line extended into Keweenaw county to furnish facilities for work that is being conducted.

Work on the improvements at C shaft of the Mass Consolidated mine are being rushed with all possible speed. The Mineral Range spur to the shaft is completed and in condition to permit trains being run over it, but more time will be required to ballast the track and prepare it for heavy traffic. The new shaft will be completed and fully equipped by Jan. 1. Sinking has reached the sixth level and the character of the ground is excellent. Production will probably average 400 tons of rock daily by the first of next year. As the copper values are better than in the older

portion of the mine, a large increase in production and earnings should result. A very gratifying improvement in Mass affairs is the increasingly large output of heavy copper. For a time during the summer the yield of mass and barrel copper was light, but there has been a gratifying improvement lately.

No. 3 diamond drill hole on the Tecumseh property has encountered the Kearsarge lode. This hole is 1,000 ft. south of No. 1 shaft. The drilling was discontinued after the lode was penetrated. The width was shown to be 10 to 12 ft. and the management says the appearance of the core is very good. The hole was put down at an angle of 57° from the horizontal and encountered the lode at 375 ft. The dip of the lode is 45°, indicating that the outcrop is 520 ft. eastward of the drill hole. A pit will be started at that point to open the outcrop and a shaft sunk.

A depth of 150 ft. below the bottom of the shaft has been attained by the diamond drill at the Miskwabik property in Keweenaw county. The drill is in the bottom of the shaft, which is 170 ft. deep, and the drill workings are 325 ft. from surface. It is stated by the management that the cores taken out show gradual improvement with depth. The hole is being put down on an incline of 26°, which approximately conforms to the plane of the lode.

Indianapolis. Sept. 30.

The New Central Coal Mining Co., of Terre Haute, has incorporated with a capital stock of $100,000. The company will sink shafts and develop coal lands in Indiana. Wm. L. Williamson, James S. Rector, Terre Haute, and R. C. Browning, Indianapolis, incorporators.

According to figures compiled by Joseph H. Stubbs, State statistician, there are 17 counties in Indiana producing coal, and the number of miners employed in the 182 mines during 1904 was 17,203. The number of tons of coal mined was 9,859,940. The operating time of all the mines averaged 165 days. The number employed in the offices of the mines was 367; the aggregate of salaries paid was $633,181, and the aggregate wages paid was $8,306,206. The causes of idle time reported are embraced in the following: 81 mines on account of lack of orders; 64 mines, lack of cars; 10 mines, repairs; 4 mines, petty strikes; 4 mines, abandonment; 3 mines, shortage of miners; 1 mine, too much water; and 1 mine, no water.

Seven of the largest coal-mining properties in Indiana, producing the greater part of the No. 4 coal mined in the State, have been taken over by the United Fourth Vein Coal Co., recently incorporated in this State, with a capitalization of $1,000,000. With these acquired properties the United Fourth Vein Co. becomes one of the largest of the seven big coal combinations in the State, controlling, it is said, mines of more value than those operated by any other Indiana coal combination except the Vandalia Coal Co. The properties taken over are all in Greene, Sullivan and Clay counties and on the line of the Southern Indiana railroad. The general offices of the company will be in Linton, Ind. The principal stockholders are: L. T. Dickason, Chicago; Job Freeman, Linton; A. B. Myers, Indianapolis; M. L. Gould, Indianapolis; E. L. Wolford, Linton, and others.

A number of complaints have been filed against sundry railroad companies in Indiana before the Indiana Railroad Commission, asking for a reduction of coal-carrying rates, and to prohibit discrimination in favor of coal originating on their lines. The decisions rendered so far have been to grant substantially the relief asked for.

C. E. Barrett, secretary of the Vandalia Coal Co., recently organized to control the coalfields of Sullivan and Greene counties, has filed a copy of the articles of incorporation with the Secretary, thus complying with the foreign corporation law. The amount stated to be represented in Indiana is $1,500,000, though the entire capital stock represented by the company, organized under the laws of New Jersey, is $4,000,000. The corporation fee was $1,501.50 in Indiana.

Much interest and preparation is being made in Indiana for the mass meeting of bituminous coal operators to be held in Chicago, Nov. 22. While primarily called to organize a national body, it is attracting more attention by what is said about the contract with the United Mine Workers, for the next scale year. It is generally understood that President John Mitchell is getting ready to play the strongest game ever played by organized labor. It is to unite the strength of the bituminous and anthracite fields in a demand for better conditions for miners. The Chicago meeting will discuss the joint conference to be held in Indianapolis next January from that viewpoint.

The Southern Indiana Coal Co., with headquarters in Terre Haute, and the merger formed by the Southern Indiana Railway Co., has quoted a price for coal much lower than that prevailing in other Indiana mines. There has been a good deal of price cutting in the last few weeks by the several merger companies. That fact led to informal negotiations, which at once gave rise to the stories that there would be a merger of the merger companies, a consolidating process that eventually would bring the eight merger companies into one corporation.

With one or two exceptions the merger coal companies have not been prosperous. The separate mining properties, as a rule, were taken over at high valuations. The promoters of the merger companies proceeded on the promise, or hope, that influential interests would provide large consumers in whose companies these influential men were directors, but this has not been the case.

A new coal-carrying road is proposed by the Chicago, Indianapolis & Evansville Railroad Co., recently incorporated. It is understood that, besides affording transportation facilities for rich coal and stone fields, now practically undeveloped in southern Indiana, the new railroad company will become a large factor in the Indiana coal situation. Already the company holds leases on hundreds of acres of coal land in Spencer, Gibson, Warrick, and Pike counties.

The recent meeting of the commissioners of the Coal Operators' Association in Columbus, Ohio, of the bituminous operators in Indiana at Terre Haute, the meeting to be held in Chicago in November, and the efforts being made by the national officers of the miners' union are taken to mean that both sides are taking time by the forelock in strengthening their position when they meet in joint convention in Indianapolis next January to agree, if possible, on a scale of wages and conditions of employment for another term. In the event of disagreement we are told to prepare for one of the greatest strikes in the history of the coal industry.

Scranton. Oct. 9.

Negotiations will probably be closed the latter end of the week for the purchase by the Erie Railroad Co. of the mines of the John Jermyn estate, at Rendham, near Scranton. This is the last individual anthracite concern of any importance in the Lackawanna valley. The sale of the Jermyn mines will be an important one, for the reason that repeated efforts have been made to effect a purchase. It is understood that the purchase money will be $2,000,000. The mines were owned originally by the late John Jermyn, who at one time worked for a dollar a day as a laborer. He amassed great wealth in coal mining and was reputed to have been one of the most straightforward business men of his day. At one time the owner of a large number of mining properties, the sale of the Rendham collieries will dispose of the last held by his executors.

President Thomas, of the Lehigh Valley railroad, is expected to report to his board of directors on Oct. 18 the purchase of the Coxe Brothers & Co. property. The consideration has not been announced, but it will be a large figure, as the production is about 2,000,000 tons per annum. The acquisition of the collieries will serve to maintain the Lehigh Valley in the second rank as the largest producer of anthracite. For some time the Lackawanna company has threatened to pass to second place, especially with the opening of its virgin fields in the Nanticoke district. This will now be out of the question for some years, at least. Under an agreement with the Lehigh Valley company, Coxe Brothers & Co. ship coal over the company's own road

—the Delaware, Susquehanna & Schuylkill —to Penn Haven junction, then on their own trains with their own men, over the Lehigh Valley road to the Perth Amboy piers, where it is disposed of to the customers. This sale will leave G. B. Markle & Co. the only independent anthracite operators of any importance.

A semi-official announcement has been made of a tacit agreement whereby the tangle in the new child labor law will be avoided. So far as the clause relating to those under 21 years is concerned, the act will be a dead letter. The law was passed at the instance of the United Mine Workers and was so carelessly framed as to be impracticable. One clause provides that no child under the age of 14 years shall be employed in the anthracite breakers, and no child under the age of 16 years in the mines. There was no objection to this age limit, and it will be enforced by the operators in general. Another clause provided that no person under the age of 21 years should be employed in the mines or breaker until he had filed an employment certificate showing that he had passed the educational test; the most severe portion being a knowledge of arithmetic up to and including fractions. This would mean that about 80%, or more, of the young men now working in the mines and breakers would be thrown out of employment. Some of the operators favored a literal interpretation of the law and its strict observance in order to demonstrate the kind of legislation obtained by the mine workers. School superintendents wrote to the chief of the Bureau of Mines, asking for instructions in the matter, with the result that a conference was arranged between Chief Roderick and the three district presidents of the mine workers. It is stated that as a result of the conference the clause relating to those now at work will not be enforced, except in cases where there is reason to believe that the boys are under the legal age.

Chief Roderick, of the State Bureau of Mines, has re-assigned the mine inspectors in Schuylkill county, owing to the number in that county being increased from four to seven. The new assignments are: P. C. Fenton, Mahanoy City, 11th district; A. B. Lamb, Shenandoah, 13th; James O'Donnell, Centralia, 14th; Benjamin I. Evans, of Mt. Carmel, 15th; Martin McLoughlin, of Shamokin, 16th; one of the new inspectors will be given the 17th district, and will be located at either Lansford or Mauch Chunk; John Curran, Pottsville, 18th; M. J. Brennan, Pottsville, 19th; C. J. Price, Lykens, 20th district.

The aid of the courts has been invoked by the rival candidates for mine inspector in Carbon county. Until this year that county had no inspector of its own. Upon the passing of the law providing for the election of the inspector there was no board of examination in the county. Morgan O. Morgan appeared before the board in Lackawanna county and was granted a certificate of competency, while Isaac M. Davis appeared before the board in Luzerne county. Mr. Davis contends that in the absence of an examining board in Carbon county, provision was made that candidates should be examined in Luzerne county.

It is proposed by the Philadelphia & Reading railroad to drive a tunnel from Rausch Gap to connect with the Brookside workings, thus tapping a body of coal, including the Lykens Valley measures and several of the overlying veins. This is to be done in order to obviate the building of an expensive branch line through Pyne valley. Several years will be required to build the tunnel.

While two men were being lowered in No. 9 mine of the Lehigh & Wilkes-Barre Coal Co. at Sugar Notch, an accident happened to the cage, throwing the men and a box containing 12 lb. of dynamite a distance of 12 ft. Fortunately the dynamite did not explode, and the men escaped with slight injuries.

Dr. I. C. Newhard, chief veterinarian for the Philadelphia & Reading Co., is giving a series of lectures to the blacksmiths in the employ of the company upon the shoeing of mules, exhibiting a collection of hoofs which have been ruined by careless or incompetent work. He demonstrates by shoeing a number of mules, and has offered a prize of $25 for the blacksmith who in six months has the best-shod mules.

Workmen are pumping out water in the old Evans colliery at Beaver Meadow, preparatory to resuming operations.

Special circulars have been sent out from the headquarters of the United Mine Workers Union urging that each local maintain the efforts to increase the membership between this and April next. It is suggested that each local appoint a special committee of 12 members to secure new members. The circulars state that the statistics regarding membership of each local for the months of November and December will be made public at the convention to be held in Indianapolis in January next.

Dover, N. J. Sept. 28.

The Baker mine, formerly operated by the Allentown Iron Co., of which James B. Lewis was superintendent, has been leased by its owners to the Warwick Iron Ore Co., of 11 Broadway, New York. The lease was signed on Monday, and already machinery has been shipped and a blacksmith shop and tool shop are being built, so that as soon as the pumps can be set up the work of pumping out the shaft of the "Big Vein" will be begun.

The Baker mine has been closed for 28 years. It is owned by William H., Andrew and Thomas Baker, of Dover, the sons of William Hedges Baker, who, with his brother Henry Baker, first owned and operated the mine. Henry Baker discovered the ore there in 1865. Two veins were found. The first, known as the Mt. Pleasant vein, was struck 25 ft. below the surface. It was an 8-ft. vein. At a depth of 64 ft. the Big vein, which runs from 10 to 20 ft., was discovered.

The property was leased to the Allentown Iron Co., which took out about 150,000 tons of ore up to 1877, paying the owners a royalty of $1 a ton. In 1877 the operators got over the line into the Richard mine property, owned by the Thomas Iron Co. A lawsuit resulted which went against the Allentown Co., which threw up the lease and soon after became involved in financial difficulties. The owners of the mine, rather than be held liable for any ore which might have been removed from the Richard mine property, entered into an agreement with the Thomas Iron Co. by which the Baker mine was to remain closed for a period of 21 years, and the Thomas Iron Co. was to have the use of the Baker mine shaft to work out a large breast of ore which the Allentown Iron Co. had uncovered on the Richard property. The Thomas Iron Co. never used the Baker shaft, and the mine has been idle for 28 years, for when the 21 years of the agreement were up it was not considered advantageous to reopen it. The Baker mine was always considered a very good property. The ore contains about 60% metallic iron.

Two other old mines in Morris county have recently been reopened after having been closed for years. They are the Dickerson and the Huff mine. The Huff mine has been shipping ore for some months. The Dickerson mine, at Mine hill, is being operated by the Singer Manufacturing Co., which, a few years ago, bought Stanhope furnace and the Hude mine at Stanhope, in Sussex county, with the idea of making all the iron used by its big sewing-machine plant.

Toronto. Oct. 7.

T. H. Crowley, a prominent mining prospector, returned to Toronto a few days since from Bancroft Hastings county, Ontario, where he has discovered a fine grade of lithographic stone. The Bancroft stone is darker in color than the German article, of close texture, and free from crystal. A number of specimens are in the hands of a lithographic firm to be tested.

The total amount paid out by the Canadian Government in bounties for mineral and metallurgical production during the fiscal year ending June 30 last was $2,220,896, comprising the following items: Pig iron, $62,666; puddled bars, $7,894; steel ingots, $614,433; manufactures of steel, $293,208; lead, $233,844; lead exported for treatment, $96,800; crude petroleum, $350,047. The latter figure at the rate of 1.5c. per gallon represents a total production of 52,507,050 gallons.

Attention is again being directed to the phosphate mines of Canada, which were

at one time successfully worked. The industry has for some years been all but dead, the output being very small. In view of the prospective exhaustion of other sources of supply, which have been able to undersell the Canadian producer, a revival of the industry in the near future is looked for.

Joseph Keele, of the Dominion Geographical Survey, returned to Ottawa this week from the Yukon, where he had been working in a comparatively unknown district about 400 miles up the Stewart river. There were indications of good deposits of iron, galena, coal, copper and gold, specimens of which he obtained. He stated that the yield of gold in the territory would be less than that of last season, owing partly to the unusual dryness of the summer and to some extent to the passing of mines into the hands of large companies. When the latter, however, got down to business, the yield would be considerably increased as their equipment would enable them to work low-grade mines profitably. Mr. Keele saw no signs of the Yukon becoming exhausted as a gold-producing country.

P. B. MacNamara, Canadian commercial agent at Manchester, England, reports inquiries concerning cobalt mining in Ontario. A chemical company desires information as to quality and prices of the product and is of opinion that large quantities could be placed in Britain in the crude state.

Manager J. S. Steele, of the Jack Lake Gold Mining Co., operating the St. Anthony Reef mine, at Sturgeon lake, on Sept. 30 shipped to the Philadelphia mint the three weeks run of a 10-stamp mill, valued at $30,000, extracted from 600 tons of ore. He reports that a new portion of the vein recently opened gives promise of higher values than previous workings.

The treatment of the low-grade copper ores of the Graham mine, at Massey, Ont., by the Elmore oil process of concentrating has proved a great success. The Massey Station Copper Co., which has been operating the mine for the last three years, has expended over $300,000 upon it during the experimental stage, and the venture is now on a sound commercial basis. From a 3% ore a concentrate of 20% standard is turned out.

A shaft has been sunk a depth of 560 ft. and seven levels blocked out, five of which have been timbered and opened up. Some of the ore has been found to yield as high as 20% copper. An additional level has been run in on the ore about one mile to the west of the plant and main shaft, and two carloads shipped showing 7% ore. The Herminia Mining Co., operating two miles west of Massey has installed an eight-drill compressor and other machinery for copper mining at a cost of $50,000. It proposes sinking a double compartment shaft to a depth of 1,000 ft., it is already 300 ft. down. The English syndicate headed by Carnegie Williams, which has taken over the noted Bruce mines, is operating them on a large scale and proposes to expend about a million dollars. It will erect a smelter provided the Herminia company does not do so.

Victoria, B. C. Sept. 30.

The Tariff Commission appointed by the Government of Canada to obtain information concerning proposed changes in the tariff advocated in various parts of the Dominion, has been holding sittings at Nelson and Rossland, in the West Kootenay districts of British Columbia, and at Greenwood, in the Boundary district. In the several towns named strong representations were made to the commission in favor of tariff changes it was contended will benefit the mining, lumbering, and fruit-growing industries, respectively. The boards of trade of Rossland and Nelson submitted lengthy memorials, and these were supplemented by statements made by men prominent in connection with the industries concerned.

The Nelson memorial reviewed the position of lead mining in British Columbia. It said, in part, that as a result of the Lead Bounty Act, passed in 1903, coupled with the recent increase of import duties on "dry white lead" and "dry white lead ground in oils," a marked and encouraging advance in the production of lead ores, namely, an increase of at least 500%, is recorded, and the increase in the number of operating mines producing ore containing lead is at least five-fold. In addition, one lead smelter—at Marysville, East Kootenay—has been erected, and the capacity of the lead-refining works at Trail, also in British Columbia, has been so increased that now it is capable of refining sufficient lead to supply the lead-consumption of the whole of Canada, thus showing, quite apart from the incidental benefit to all indirectly concerned, fair direct returns for the attention already given the industry by the Government.

It was further submitted that the lead producer of British Columbia has to contend against higher prices for supplies (made high partly by the present tariff on Canadian imports), higher wages, and more expensive conditions of transportation, than have the producers of lead in many other parts of the world competing in the foreign market. These, together with the exclusion of British Columbian lead from the markets of the United States, place the lead-producing industry of this province under a serious handicap, in an attempt to secure adequate returns to cover expenditure, in selling the surplus lead of the province in the markets of the world.

The whole question, therefore, is to continue to secure to the industry such assistance by tariff, or otherwise, as will give the producer of lead ore a fair return for his lead, and thus enable him to operate at a profit, and to place the industry upon a permanent basis. The prosperity of the lead industry, it was contended, is an essential to the development of much of the mineral wealth of Kootenay. To secure a full development of the valuable silver and gold resources of the province, the lead ores—so necessary for the proper and economical treatment of such other ores—must be mined to their fullest extent. The prosperity of these industries, in turn, means the prosperity of the smelters, coal mines, transportation companies, wage-earners, merchants, and, in fact, all business carried on in the country.

Besides other facts and figures contained in the memorial, it was stated that in the silver-lead mines (alone) of British Columbia, including the many concentrating mills and mine plants, there is invested at least $20,000,000, and this is exclusive of the re-investment, in development and equipment, of large sums of money realized from ores mined. In addition, a considerable amount is invested in "dry ore" mines, these being dependent for their prosperity, and in many cases for their existence, upon the production of lead ores, and the maintenance of a home lead-smelting and refining industry. There is invested in railroads and steamboats dependent on these mines and their incidental mining industries for their traffic, about $14,700,000. In the lead-smelting and refining industries of Kootenay, exclusive of all other smelting plants, there is invested about $1,000,000. There are employed directly in the silver-lead mines of Kootenay about 1,500 men, who receive yearly at least $1,900,000 in wages. In addition, a considerable amount is paid to the employees of the lead smelters.

It is announced that the strike of the miners of the Western Fuel Co., operating coal mines at Nanaimo, Vancouver Island, was called off by the miners Sept. 30. A week since, W. L. Mackenzie King, deputy minister of labor, arrived from Ottawa to endeavor to bring about a settlement of the difficulties between the miners and the company. His coming had not been requested by either party, but he came under the provisions of the Conciliation act, which, though not compulsory, provided for the friendly intervention by the Dominion government in labor troubles. After several lengthy conferences with the miners and the management of the company, separately and jointly, a committee of five was appointed by the men to arrange matters with the manager of the company, which, it was stated, persisted in declining to negotiate with either the Western Federation of Miners or the United Mine Workers of America, both of which have branches at Nanaimo, though ready at any time to discuss the differences with the men themselves. The ballot taken last Saturday night resulted in 239 voting in favor of acceptance of the settlement condition-

ally arranged by the committee and 93 against it. The strike, which has lasted over four months, was, therefore, declared to be at an end, and preparations for an immediate resumption of work are in hand. The settlement is in the nature of a compromise. A working agreement for two years is stated to have been signed. Many of the miners employed in the Western Fuel Co.'s mines at the time of the strike have left Nanaimo, some of them finding employment in the Wellington Coal Co.'s collieries at either Extension or Cumberland, both on Vancouver island, and others seeking employment elsewhere.

Mexico. Sept. 20.

The continued excellent showing of Pedro Alvarado's Palmillo mines, in Parral, keeps mineral land in that district in active demand. It is now said that Grant G. Gillette, the former cattle man of Kansas City, who has made several large deals in Parral properties, has just obtained options on considerable ground of José M. Botello, surrounding the Palmillo, and is negotiating with New York capitalists for the sale of the same. Eugene Davis has raised capital in Washington, D. C., for the purchase of the Capuzaya mine, also adjoining the Palmillo, and other American capital has bought the Sierra Madre mines, adjoining the Capuzaya, from Stallforth Bros. D. M. Evans has organized a combination, to be known as the Parral Smelting Co., with a capital of $1,000,000, gold, and has asked for a Government concession for a 250-ton smelter for Parral to do custom work and treat the ore from the mines which he controls. Among these are the Guadalupe, a copper property, and the Big Four and Providencia, two good lead properties. The president of the new company is Samuel Garrison, of the Expanding Fire Proofing Co., of Pittsburg, and Mr. Evans will be manager. The United States Mining Co., of Parral, is said to have ordered a 300-h.p. steam turbine from the H. D. Crippen Manufacturing Co. for its new power plant. At Dedrich, on the Rio Grande, Sierra Madre & Pacific Railroad, W. C. Greene is preparing for the erection of a 200-ton cyanide plant, to be ready by January 1. For the Concheño district he has ordered a 300-ton plant of the Elmore oil process, for the treatment of the ores from his properties near the small town of Don Luis, where the mill will be situated, as well as to do custom work. Near Baca station, east of Parral D. W. Shanks, manager for the Almoloya Mining Co., has ordered a 60-h.p. gas producer for a compressed-air and electric plant. Preparations are being made by Currie & Gassell, at Santa Barbara for the pneumatic treatment of the zinc and lead tailings from the San Diego mine and mill of the Torreon Metallurgical Company.

James I. Long, the American consul in Parral, is quoted as saying that work will be started before the end of the year for the extension of his Parral & Durango Railroad into Guanacevi, in the State of Durango. The Guanacevi Exploration Co. has obtained control of the San Rafael mines, near Guanacevi, and will at once start active development work. At Indé, in the State of Durango, a great deal of new work is being inaugurated: La Cruz mine has just completed its little 10-ton pyritic furnace, and is preparing to blow in. David Gough and associates have remodeled the old 40-ton matte smelter of La Roca, and are buying ores, preparatory to blowing in. G. S. Benton has ordered from El Paso a 50-ton cyanide mill for the treatment of his ores in the Guadalupe mine, where he has 40,000 tons of gold ore opened up. M. E. Parks has interested Wm. Parker, of St. Louis, president of the Coahuila Mining & Smelting Co., in the erection of a 20-ton concentrating and cyanide mill for handling some 20,000 tons of 30-oz. silver ore on the dumps of the Caballo and Portrillo mines. Messrs. Wm. Pettit and G. T. Chapman, of Parral, are preparing to start underground operations on the Caballo, as well as development work on some excellent gold prospects below the Guadalupe mine of G. S. Benton.

Six miles east of the Ojocaliente station of the Mexican Central Railroad, in the State of Chihuahua, T. J. Driscoll is said to have struck some high-grade bismuth ore, which he is now developing.

London. Sept. 30.

A few months ago I mentioned that the directors of the Etruscan Copper Estates, Ltd., had commissioned Mr. Alexander Hill to go out once more to their property and examine the mine. It is just three years since Mr. Hill went out before. He then reported that there was no supply of ore to warrant the claims of the promoters, and he advised that all work except prospecting should be suspended. His report, just issued, giving his account of his second visit, gives practically identical opinion and advice. The directors now appear to believe Mr. Hill and are getting down to serious mining operations. Mr. Hill recommends that diamond drilling should be actively carried on, and that no smelting should be done until enough ore has been accumulated for a fairly long run. It is interesting to note in his report, that he found no proper records kept of ore mined and smelted until Sept. 1, 1904. Since that time 58,000 tons of copper ore were mined and 43,000 tons smelted. The assay value of the ore mined was given in the records as 2.68%, but working back from the figures of production he found that assay value of the ore could not have been more than 1.5%. Mr. Hill's prognostications for the future are not very bright, though he says the mine is a very good prospect. He points to irregular orebodies, patchy and low grade. For a company weighted with £575,000 common stock and £200,000 in debentures, this outlook is not grand.

I referred in the JOURNAL of Sept. 16 to the fact that the attention of London promoters has lately been turned to Broken Hill problems. The scheme for buying up the zinc tailing is getting into shape and a company called the Zinc Corporation is to be formed in Melbourne before long. Another interesting piece of news is that Lake View Consols, one of the companies operating at Kalgoorlie, is to acquire a half interest in the control of the Broken Hill South Blocks Co. The Lake View Consols will be remembered by your readers as the mine which produced 30,000 oz. of gold a month for a short time during the Whitaker Wright régime, and then collapsed. For some time now, Messrs. Bewick, Moreing & Co. have had the mine in hand developing and exploring extensively, but no discoveries of value have been made and a year ago it became obvious that some other property should be looked for. The finances of the company during recent years have been well cared for, and funds have been accumulated to the extent of over £100,000. This deal in Broken Hill South Blocks came rather suddenly. A syndicate had obtained an option on the property and had offered it to several companies and individuals. Lake View Consols got it, by having at command large sums in cash, and the deal was put through in a hurry, as the syndicate's option expired almost immediately. The Broken Hill South Blocks is to be reconstructed with a capital of £200,000, half of which is to go to the old company and half to Lake View Consols in consideration of £50,000, which is all to go to working capital. It is true that Lake View Consols has actually to pay £73,500 in cash, but the balance £23,500 goes into the pockets of the syndicate through which the deal was effected. The South Blocks mine contains, according to Mr. C. S. Herzig, Messrs. Berwick, Moreing & Co.'s representative in Melbourne, 400,000 tons of ore, three-quarters of which is actually blocked out. The average contents of the ore are 23% lead, 12.5% zinc and 3.5 oz. of silver per ton. By mechanical concentration a product can be obtained, out of which 70% of the total lead and 50% of the silver can be recovered. With lead at £12 a ton the profit is estimated at 6s. a ton of ore. The zinc tailing will have some prospective value if the hopes of the Zinc Corporation are fulfilled. As regards the future of the mine itself, it may be mentioned that it is only down 400 ft., and adjoining mines are working at 700 ft. in excellent bodies of ore. The chances are, therefore, greatly in favor of there being far more ore in the mine than Bewick, Moreing & Co. vouch for.

General Mining News.

CALIFORNIA.

AMADOR COUNTY.

Oneida Mining Co.—This mine at Jackson is being sunk deeper. A winze is to be sunk from the 2,400 level to a depth of 600 ft. It is hoped to reach a higher grade of ore than is at present being worked.

Zeile Mining Co.—Thirty of the 40 stamps of this mine at Jackson are to be run by electric power and the other 10 by water, the water being necessary to carry off the tailings.

BUTTE COUNTY.

Yuba.—This mine, on Morris ravine, four miles above Oroville, is being reopened by B. C. Clark and E. A. Stent, of San Francisco. A bedrock tunnel will be run and an upraise made to the gravel channel.

Yuba Copper.—This old copper mine, near Honcut, which was worked for a time in 1860, is being pumped out. There are three distinct ledges on the property.

CALAVERAS COUNTY.

Salvator.—After an idleness of two years, this mine at Jesus Maria is being opened, and the tunnels are being repaired. Operations will now be conducted on a larger scale than before.

FRESNO COUNTY.

Copper King.—At the mine, near Clovis, 100 tons of ore are being taken out daily. The ledge is being worked at the 600 level. The work is being done under the receiver, and the ore is shipped to Tacoma for reduction.

HUMBOLDT COUNTY.

Fern Leaf.—A three-stamp mill is being erected in this mine near Orleans, by Fred H. Elder, representative of the company. The mine is being developed with some rich ore in sight. The mill is the first one erected in Humboldt county. There are four claims on the property.

INYO COUNTY.

Panamint Range.—There is great activity in this section at present and there are more prospectors at work than at any time in the history of the region. In coming down Happy Cañon, which is very rough, Williams, Reed & Babcock found a 6-ft. vein of copper and lead ore, carrying gold also.

MONO COUNTY.

Standard Consolidated Mining Co.—The newly adopted process of ore treatment at this company's mill, Bodie, includes crushing in cyanide solution, further crushing in tube mill and final treatment by the Moore process. The ore is crushed to 30 mesh in the 20-stamp mill. Crushing is done in cyanide solution, using two pounds of cyanide per ton of ore. Plate and battery amalgamation save 60% of the values, which run from $18 to $20 per ton. The plates have an inclination of 2½ in. to the foot. After concentration by vanners the pulp is elevated to the tube mill, where it is first classified by spitzkasten and the coarse material fed to the tube mill, together with the sands and slimes from the vanners, which are fed dry. Pebbles from Mono lake have been used, but, being irregular, they slide and will not roll, causing greater wear on the liners and requiring more power. Hereafter, Iceland flints, now being shipped, are to be used. The tube mill crushes to 150 to 200 mesh. The coarse material from the mill is separated by spitzkasten and recrushed. The pulp then passes to settlers, and the settlings, 25 to 30% solid, are treated by the Moore process. This makes an extraction of 85% from the slimes and mill tailings, as compared with 70% extraction obtained before regrinding was tried. The concentrates from the vanners are ground fine with strong cyanide solution in pans and also treated by the Moore process, giving an extraction of 95%. In the Moore plant two "baskets," or units, of filters are used, consisting of a series of parallel plates 4 in. apart, each plate being about 20 ft. long and 4 ft. high, consisting of a light framework covered with canvas. In the original plant a suction pipe passed through the top at the center to within ½ in. of the bottom; two blowpipes also entered at the top. The whole series was hung from a crane, which raised and lowered the basket and carried it from one compartment of the tank to another. The filter is lowered in the slimes compartment and the vacuum pump started, the slimes being agitated to prevent settling. The suction is continued until a coating of slimes is formed on all parts of the filtering surface to a depth of from ¾ to 1 in. During this time the pump is continuously discharging the clear gold solution. The crane then carries the basket to the weak solution and to the wash water, the vacuum preventing the cakes from dropping off during the transfer. To discharge the cakes, a blast of air is turned into a pipe connected with the blowing pipes of each plate and the vacuum pump is stopped, the air dislodging the slime cakes, which drop into cars below. The filtrate from the baskets passes to the zinc boxes and thence to the sump, whence the solution is pumped to the mill. The Moore process is giving satisfaction.

NEVADA COUNTY.

Birchville.—This old mine, near Graniteville, is to be pumped out and explored by John McKelvey, as soon as the hoisting and pumping machinery is in place.

Wade Hampton.—In this mine, at Graniteville, Wm. McPherson and Hugh Duncan have uncovered some rich ore while sinking the shaft.

Talbot.—Arrangements are being made to put up a mill on this mine at Willow valley, near Nevada City.

Banner.—This mine is being reopened by Belshaw, Voorheis, Phillips and others. The water has been lowered 275 ft. in the 670-ft. shaft, and new timbers are being put in.

Union.—A 16-in. vein of good ore has been encountered in this mine at Banner Hill (Nevada City, Post Office).

PLACER COUNTY.

Hidden Treasure Mining Co.—From the surface they are now down 315 ft. in the new air-shaft, and have upraised 332 ft., leaving 100 ft. to cut, before the new ventilating shaft will be finished. The new main tunnel being driven will cut off 1,600 ft. from the old tunnel. The output of gravel is to be increased from 400 to 600 tons in 24 hours.

Last Chance.—This mine in the Ophir district is to be opened by John and Andrew Johnson, who will work the Monahan shaft to connect with the present works.

PLUMAS COUNTY.

Lowry.—This old mine, west of Greenville, is to be retimbered and sunk deeper. It is now owned by Jeff Lowry. The mine has been idle for some years.

SAN DIEGO COUNTY.

Native Gem Mining Co.—In the Esmeralda claim, near Mesa Grande, this company has encountered a pocket of unusual size. Many large pink beryls have been taken out.

COLORADO.

TELLER COUNTY—CRIPPLE CREEK.

Homestake Mill.—Operations have been commenced again on this mill by some of the Eastern stockholders. It is understood that these people have raised considerable money to carry on operations. The mill has been shut down for considerable time. The plant is constructed to treat from 600 to 1,000 tons per day of ore by the cyanide method. The ore is of an oxidized variety, and is of very low grade. It can, however, be mined and milled very cheaply, and if the values hold up at all, it can be made to pay. A large amount of money has been invested in the mill, and the outcome of the property is being watched with interest. It is situated on Ironclad hill not far from the Wild Horse mine.

Cyanide Mills.—Besides the Homestake mill, there are several smaller cyanide mills in the district. On the Wild Horse is one that is reported to be doing very good work. Also one has been installed on the Los Angeles property near the Last Dollar. One is also in operation on Copper mountain, north of town. This is handling the low-grade ore from Copper mountain, and is reported to be doing good work. One at Gillett is also being operated, handling the dump of the old chlorination plant, that formerly treated the ore from the district. Beside these

a number of other small plants are experimenting. The King & Craig mill on Gold hill, near the Anaconda mine, should be mentioned also.

Cresson.—This property is producing a fair amount of medium grade ore. The property is situated in Eclipse gulch, near the Blue Bird mine. This property is under lease to the Bull Hill Mining & Development Co. and a large amount of work has been done.

Drainage Tunnel.—Work has been commenced on the survey of the best site for the proposed tunnel. There seems to be no doubt at all that this tunnel will be built by the mine-owners of the district.

IDAHO.

SHOSHONE COUNTY.

It is reported that E. M. Smith, who has been prospecting in the Murray district for some years, has discovered a promising tungsten deposit. The main ledge has been opened by a tunnel 200 ft. in length. A second tunnel, about 100 ft. above the mouth of the main tunnel and 400 ft. westward, has been run into the mountain for a distance of 500 ft. It is proposed to continue this tunnel 100 ft. further and use it while stoping the ore to the surface. The ore assays well in tungstic acid and carries a little gold and silver.

LOUISIANA.

CALCASIEU PARISH.

Jennings.—The Pelican Oil & Mineral Co., capital $30,000, has been incorporated. It owns a 50-acre tract in the Mamon field.

Tierce No. 6 is in, but had to be flowed with air.

Wilkins No. 4 gushed 3,000 bbl. for a few days, but is now under the compressor.

Jennings Heywood Oil Syndicate No. 5 has been brought in; the gas pressure of low and it will have to be pumped.

The field is producing 28,000 bbl. daily and the shortage of tank cars still continues. Private cars cannot begin to fill orders, and the Southern Pacific railway needs crude at present prices and naturally has use for company cars.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Calumet & Hecla.—Nine-ton skips are now being used successfully at this mine. They are much the largest skips in use in the district. A 9-ton skip is in use at No. 5 shaft, Calumet branch, and No. 8 shaft, Hecla branch. At the vertical Red Jacket shaft the two Kimberly skips in use have a capacity of 7½ tons each. A large number of new tram cars of an improved pattern are being sent underground at this shaft. The cars will hold 3½ tons each. Removal of the supply house at Lake Linden, which for many years was located at the old dock near the Calumet mill, to the large dock near the smelting plant, has been completed. This warehouse is 48 by 115 ft., of structural steel. It is used as a receiving storehouse for freight, as much of the supplies as possible being shipped in during the season of navigation. The dock on which it is being erected is 700 ft. long. An addition 48 by 60 ft. is being built on the warehouse.

Champion.—Rock shipments now crowd 2,150 tons daily and the refined copper yield averages 26 to 27 lb. a ton. Shaft E, the deepest of the mine, is below the tenth level. Drifting south on the third level has progressed 1,400 ft. and on the fourth level 1,200 ft. The character of these openings, which are headed toward the Globe tract, is favorable.

Challenge.—Work in the east crosscut has been discontinued, after penetrating a conglomerate which parallels the Baltic lode throughout all the mines where it has been opened. Drifting on the lode encountered in the west crosscut continues and has progressed 50 ft. in each direction. This lode is 37 ft. wide, where intersected by the crosscut and the rock shows a striking resemblance to the Baltic.

Copper Range Consolidated Co.—President Paine says the cost of copper sold is 8c. per pound. It is purposed to make the last dividend of the year payable prior to Jan. 1, so as to bring four payments, instead of three within 1905.

Franklin.—Ledge rock has been encountered in the diamond drill hole on the northerly portion of the Franklin Junior property. The sand pipe, which dips east at an angle of 45°, encountered rock at a depth of 120 ft. The work was difficult, large boulders, which had to be blasted away before sinking could be continued, being prevalent in endless succession to a depth of 120 ft. This hole is 1,500 ft. south of the line of the Rhode Island, and the management of that company is naturally deeply interested in the work. At the diamond drill hole on the southerly portion of the Franklin Junior, much difficulty has been encountered, but it is believed that work has at last reached the ledge, after penetrating 57 ft. of overburden. This hole is 1,500 ft. north of the Arcadian line.

Tecumseh.—The diamond drill at No. 2 location has not yet encountered the Kearsarge lode. As this hole is located near the Metalline property of the Calumet & Hecla it may have an important effect on that tract. The shaft at No. 1 location is 20 ft. deep and opening fairly good rock.

KEWEENAW COUNTY—COPPER.

Allouez.—Rock stamped at the Centennial mill averaged 45 lb. of mineral to the ton this month. No. 1 shaft continues to open rich ground as sinking progresses and there appears to be no diminution of copper values.

Bohemian.—Water is being kept out of the workings on this property to permit inspection at any time. The options held by the syndicate which explored the property and discontinued work three months ago, when its funds became exhausted, have expired. The shaft is 80 ft. deep and there are 200 ft. of lateral openings at that depth.

Cliff.—Two diamond drills are in service on this property, owned by the Tamarack Mining Co. The strike of the lode opened by the Miskwabik is being established across the entire Cliff property. This lode is to all appearances identical with the Kearsarge amygdaloid.

MONTANA.

GRANITE COUNTY.

Bimetallic Mining Co.—The Bimetallic mine, at Granite, is expected to be in operation again within the near future, under a long lease to Paul A. Fusz, president of the company, and associates.

The mine and mill were closed down last summer, as it was believed the ore had been worked out.

The Bimetallic company's mines at Sunrise will also be opened at once, and the lessees will employ a large number of men. This means a big mining revival in the southern portion of Granite county.

In connection with this deal, it is rumored that the syndicate will probably open up several properties within the vicinity of Phillipsburg and Granite which will give employment to an additional force of men.

Fergus Gold Mine.—W. H. Fergus and associates have sold to the Fergus Gold Mining Co., of Chicago, all the underground rights in the Fergus tract, near Kendall, with such surface rights as are needed for mill sites, dumps, tracks, etc., for $2,999,750, and arrangements have now been completed by the company to start the diamond drill at work. The machinery is already set up on the ground, and will go to a depth of 1,500 ft. if necessary.

The Fergus tract comprises 4,500 acres, and extends northwest from Kendall, adjoining the Bullard ground, owned by the Kendall company. The new company expects to find the big blanket vein in this ground, and if successful will have a cyanide proposition of large proportions. The company has ample capital to carry on these operations in an exhaustive manner, and engages in the enterprise with bright prospects.

BEAVERHEAD COUNTY.

Bannack District.—The quartz mining section tributary to Bannack is looking up this summer and there are more men working now than there have been in the past 10 years. In the New Departure mine, in the Blue Wing district, the pioneer silver-producing section of the State, some new orebodies have recently been opened up and a considerable amount of

100-ounce ore has been shipped to the smelters. This mine is located about half way between Bannack and Dillon and has been worked almost continuously since the 70's.

The Polaris mine, in the Lost Cloud district, about 20 miles above Bannack, is another property which is helping the old town materially, and it is being developed by Butte parties, with the result that good ore has been encountered in nearly every part of the mine.

Further up Grasshopper creek, in the Elkhorn district, the properties which have been worked in a desultory manner by the Driscoll Bros. for the past 20 years, have recently passed into the hands of Eastern capitalists, who have begun their development systematically.

Near Bannack is the Excelsior group, and promise is held out that a company will take hold of the property shortly and extensively develop it. The mines are located just below the town of Bannack, and in the early days yielded rich gold ore. Considerable development has been made on the property in an effort to find other rich pockets, but all of the ore uncovered has been of a comparatively low grade. There is plenty of it, however, and the owners of the claims are confident of finding ore of milling grade.

NEVADA.

NYE COUNTY.

The construction of the line for the transmission of electric power from Bishop Creek, Cal., to Tonopah and Goldfield has been completed. The line is 103 miles in length, and, including branches, required more than 350 miles of three-fold aluminum wire, weighing over 100 tons. Owing to the expense of hauling water and supplies to the construction camps on the desert the line is said to be one of the most costly ever constructed. The poles equipped with three insulators averaged in cost over $45 each. The plant is capable of generating 2,000 h.p., shortly to be increased 50%. One thousand horsepower has already been contracted for by mining companies at Goldfield, and it is expected that Tonopah companies will contract for a good deal of power. It is probable that this power company will before long extend its transmission line to Diamondfield and the entire Bullfrog district, as it can easily generate 10,000 h.p. at its station in California.

At the present time there are three mines in the Tonopah gold camp which are on a paying basis. These are the Tonopah Mining Co., the Montana Tonopah Co. and the Tonopah Extension Co. All three of these companies have been paying dvidends only since the beginning of the present year. The Tonopah Mining Co. has paid two dividends of 25c. each a share, one in March, and the other in July, and a third is due in October. The Montana Tonopah Co. and the Tonopah Extension Co. each paid one quarterly dividend of 10c. a share in July last. The second dividend will be paid next month. The capitalization of each of these companies is $1,000,000, divided into 1,000,000 shares of the par value of $1 each. Montana Tonopah, however, has 165,000 shares still in its treasury, and Tonopah Extension has nearly 300,000 shares reserved in its treasury.

One of the most important assets of the Tonopah Mining Co., which is dominated by Richard Rushton, George Elkins, Henry D. Moore, the American Tobacco people and certain Houghton, Mich., interests, is the railroad which extends from Tonopah to Sodaville, a distance of 65 miles, connecting there with the Carson & Colorado, running in to Salt Lake City, a distance of nearly 900 miles.

Montana Tonopah, the second of the dividend-paying mines, showed net earnings for the last fiscal year of nearly $500,000. It is estimated to have $3,000,000 shipping ores in sight outside of milling ores.

Tonopah Extension, the third dividend payer, is controlled by Charles M. Schwab and Pittsburg interests, who are said to have spent from $80,000 to $100,000 in improving the property. The mine is well equipped with modern machinery of the best type, and is clearing up about $100,000 in net profits a month.

ESMERALDA COUNTY.

The announced purpose of Senator W. A. Clark and his associates to extend the San Pedro, Los Angeles & Salt Lake railroad into the Bullfrog and Goldfield mining regions of Nevada is to be carried out by means of the Las Vegas & Tonopah Railroad Co., which filed its articles of incorporation with the Secretary of State of Utah recently. The capitalization is $4,000,000, and the company will proceed at once to build a line from Las Vegas on the Salt Lake route through the Bullfrog and Goldfield regions to Tonopah. The incorporators are: J. Ross Clark, personally and as trustee for William A. Clark, and R. C. Kerens, J. R. Walters, W. H. Comstock, C. O. Whittlemore and Pennel C. Cherrington.

OREGON.

BAKER COUNTY.

United Elkhorn.—Work has been resumed on the big tunnel, which will revolutionize matters at this mine in the Rock Creek camp, 16 miles west of Baker City, under the management of Edward I. Field. This tunnel is already in about 2,000 ft., and when completed will have a length of about 1½ miles. It will tap the vein 1,500 ft. lower than the present workings, which are now on the 400 level. Mr. Field has 40 or 50 men at work now, and is increasing the force as required. Concentrates and ores are being shipped daily to the Sumpter smelter at the rate of about 10 tons.

Gold Bug.—A valuable strike is reported in the Gold Bug mine, in the Greenhorn district, which is the property of a company managed by T. S. Van Vleet. Development work has been in process for about three years. The manager now thinks he has, at a depth of 700 ft., secured a vein which is 8 in. wide, carrying free gold.

Sumpter Smelter.—Manager F. D. Fuller reports that they are now rushed with work in all departments, and that there is plenty of ore on hand and in sight to keep the smelter busy. Large shipments are being received from the mines in the Cornucopia districts, east of Baker City, and in the Rock Creek district, just west of Baker City.

Union Companion.—Pierre Humbert, the San Francisco mining man, has just completed the purchase of the John E. Searles, or New York, interests in this group, in the Cornucopia camp, 60 miles east of Baker City. It is said that he paid Searles $25,000 and assumes a mortgage on the property. Humbert has 60 men at work on the mine and is shipping ore.

SOUTH DAKOTA.

LAWRENCE COUNTY.

Victoria.—Free gold has just been struck in the Victoria property. The rock hitherto encountered has been cyaniding ore and has shown no free gold. An adit is being driven in the side of the hill and a crosscut has just been started. While blasting a piece of rock was blown off which was found to be covered with free gold. Upon examination much of the same rock is found in the face of the drift.

Queen of the Hills.—This company has just opened up a good body of gold ore in the shaft at a depth of 135 ft. The manager had been expecting to encounter this ore, as he had prospected some distance with the diamond drill. The extent and value of the orebody has not yet been ascertained.

United States Assay Office.—The largest gold brick and the most costly ever handled in this office is now on exhibition. It was brought here for refining, and exceeds by 400 oz. the heaviest brick ever treated here. It weighs nearly 2,000 oz., and is valued at about $30,000.

Puritan.—Within 30 days this company will be treating its ore at its new mill in Strawberry gulch. The work of changing the concentrating plant to cyaniding is almost completed. When the plant is in shape it will have an output of 200 to 250 tons per day. One of the most important features of the mill is the Moore process of separating slime. Though work has gone only to the depth of 150 ft., there is plenty of ore in sight.

PENNINGTON COUNTY.

Tungsten Discovery.—The American Tungsten Mining & Milling Co. has discovered a large vein of wolframite on its property just outside Hill City. A two-compartment shaft has been sunk 50 ft. A pump is now being installed to control the water encountered. As soon as this is done, drifting on the vein will commence.

Clara Bell.—Work on this property progresses satisfactorily. An incline shaft has been sunk to the depth of 300 ft. and a hoist is being put in. As soon as this is completed, a perpendicular shaft will be sunk to connect with the incline, which will be used for ventilating purposes. The company has a large amount of ore in sight and is putting in an addition to its mill.

TENNESSEE.

Weaver Coal & Coke Co.—This company has acquired about 5,000 acres of coal lands in the eastern counties of the State and expects to make extensive coal developments within a radius of 70 miles of Knoxville. The property is located chiefly in Cumberland county. It is stated that coke plants will be built and a branch railroad to the Tennessee Central main line. Henry A. Weaver, of Chicago, is president, and J. E. Van Blarcom, of St. Louis, is vice-president of the company.

MARION COUNTY.

Gayoso Coal Co.—This company has increased its capital stock from $100,000 to $500,000; it is also reported that it will greatly enlarge its properties and coal output. The incorporators are: L. B. Musgrove, A. S. Preston, Murray Cannon, H. P. Gibson, L. Walton and E. G. Bruce.

TEXAS.

HARDIN COUNTY.

Saratoga.—Rio Bravo Oil Co. Nos. 225 and 226 came in pumpers only. The Producers Oil Co. had a standard drilling rig, boiler-house and two small tanks and contents destroyed by fire. The company is drilling two wells on the Little Jap lease and one well on the Alvey lease.

The Britton Oil Co. No. 12 has now been flowing nearly six months.

HARRIS COUNTY.

Humble.—The production is steadily declining; it probably does not exceed 45,000, as against a maximum of 127,000 bbl. Crude has made an advance of 2c., and now sells at 22c. per barrel.

JEFFERSON COUNTY.

Beaumont.—Creditors of the Texas Crude Oil & Mineral Co. have applied for a receiver on the ground that the company is insolvent. The Attorney General of Texas, and the attorneys representing various oil companies, who obtained injunctions restraining the collector of taxes, imposed under the Kennedy gross tax bill, have reached an agreement under which the companies will pay the producers' tax, but not those imposed on pipe line owners, dealers or refiners, and no penalties for failure to do so are to be inflicted. A test case will be submitted to the courts on an agreed statement of facts and all questions raised in the various suits filed, including the constitutionality of the act will be decided at an early date. The arrangement was one desired by the oil operators and will materially reduce legal expenses.

Beaumont.—The estimated production at south Texas and Louisiana fields in August was 4,200,000 bbl., a decrease, as compared with July, of 1,000,000 bbl. Present daily output is: Spindletop, 4,500; Batson, 8,000; Sour Lake, 7,000; Saratoga, 7,000; Humble, 45,000; Jennings, 27,500 bbl. Latest prices for crude are: Spindletop, 30c.; Sour Lake, 30c.; Batson, 20 to 26c.; Saratoga, 24c.; Humble, 22c.; Jennings, 22c. per barrel. The greatly decreased production at Humble and the slowly decreasing output of all the other old fields have caused the daily production to fall below 100,000. Even this amount is in excess of the consumption. The large quantity of stored oil and the uncertain position at Dayton have a tendency to hold prices down. No person can forecast the acreage or productiveness of the new field at Dayton. There will be the usual stampede, and the field will be developed rapidly.

LIBERTY COUNTY.

The sole question discussed in oil circles is "will Dayton be another Humble?" Already there are 25,000,000 bbl. in storage, and the only favorable feature has been the rapid decline in the output of all the older fields. The production is still larger than consumption, and operators in a gusher field lacking storage must sell at any price. The pipe lines and tanks hold millions of barrels of low-grade oil best suited for fuel, and holders are apprehensive of the low gravity of the crude in the new field. Dayton certainly has some gushers and if their capacity proves large, lowgrade oil will drop with great rapidity. The Humble output last week increased to 40,000 bbl. daily, but the increase occasioned by some new wells of the Moonshine Oil Co. is only temporary and the output will probably be as low as 25,000 bbl. in a few days.

Dayton.—The first gusher in this field has been brought in at a depth of 800 ft., and is doing 1,500 bbl. The new well is No. 5 of the Paraffin Oil Co., and is situated about 300 ft. from No. 3 (owned by the same company), which is a small pumper. The oil is about the same grade as other south Texas crudes. A big rush to this field is expected, and some land has sold for $2,000 per acre. Shipping facilities will be ready for the producers, as the Security Oil Co. pipe line is nearly ready for use.

Wells now drilling are: Port Vernon Oil Co., down 1,100 ft.; Producers' Oil Co., down 650 ft.; Sun Oil Co., No. 1, down 1,000 ft.; No. 2, down 1,700 feet.

UTAH.

BEAVER COUNTY.

Wasatch King.—George De Freest, secretary and managing director of this company, has returned to Troy, N. Y., from an inspection trip, after having arranged for the winter campaign of exploration. The company has, it is stated, a fund of $30,000 to draw on for development purposes. New equipment is to be ordered.

Skylark Copper.—This company is still sinking a shaft in which has been encountered a large body of low-grade ore, mixed with considerable high-grade stuff.

Burning Moscow.—This property is contributing, for a time, two cars of ore per week to the smelters.

Harrington & Hickory.—Ore shipments have been inaugurated from this property. It is one of the Majestic Copper Co.'s mines. The ore carries values principally in lead. The shaft, now 400 ft. deep, is to be let down further.

MORGAN COUNTY.

Carbonate Hill.—This property is making ore shipments to the Salt Lake smelters quite regularly. M. A. Daugherty, of Salt Lake, is manager.

SALT LAKE COUNTY.

Columbus Consolidated.—In order to provide additional electrical energy at the mine and mill, this company has installed another generator. The ore shipments from this property during the month netted a little over $30,000.

TOOELE COUNTY.

Cyclone.—At a depth of 660 ft., a 14-in. vein of high-grade lead ore has been opened in this property.

Consolidated Mercur.—At the mill of this company during August, 22,000 tons of ore were treated, the ore running better than $4 a ton.

Black Diamond.—This company, at Stockton, is endeavoring to get a favorable contract with the smelters, preparatory to inaugurating regular shipments.

VIRGINIA.

Virginia Iron, Coal & Coke Co.—This company, which owns property in several counties in the southwestern part of Virginia, reports that its gross receipts for the year ending June 30, 1905, were $3,769,912. The net earnings were $516,512; taxes and fixed charges amounted to $426,833, leaving a surplus of $89,679 for the year. With regard to the Virginia & Southwestern railroad, controlled by this company, a traffic agreement has been arranged with the Norfolk & Western which permits of freer shipment of the product

of the Coal & Iron Co.'s mines, and also allows some concession on freight charges on raw material shipped to the furnaces of the company.

WISE COUNTY.

Esser Coal & Coke Co.—This company was incorporated recently with $60,000 capital stock, to mine coal and manufacture coke. G. H. Esser, of Dorchester, Va., is president, and C. C. Hyatt, of Norton, Va., secretary-treasurer.

WASHINGTON.

FERRY COUNTY.

Ben Hur.—This mine is shipping about a carload of ore a day to the Northport smelter, and some to Greenwood for converter lining. The over-supply accumulated on the B. C. Copper Co.'s yard, at Greenwood, has been nearly all consumed, and the Ben Hur Gold Mining Co. expects to resume shipments soon, according to contract, at the rate of 400 tons a month, to the Greenwood smelter.

It is intended to put the shaft down 500 ft. deeper and open new levels. The hoisting engine now in use will answer for sinking from 200 to 250 ft. deeper. The two new Leyner "Terrier" drills in use are giving great satisfaction in stoping.

WEST VIRGINIA.

Crab Orchard Improvement Co.—This company was incorporated recently with a capital stock of $1,000,000. C. J. Wittenberg, of New York, is president. This company took over the property of the Crab Orchard Land Co., which has been controlled by local capital for many years. This land, which contains over 10,000 acres of New River coal, has been watched with considerable interest of late on account of its being traversed by the Chesapeake & Ohio railroad, and the new Tidewater railroad, and unusual efforts have been made by both roads to control the tonnage.

Deepwater-Tidewater Railroad.—This system is under construction from Deepwater, W. Va., a town on the Kanawha river, 35 miles southeast of Charleston, on the main line of the Chesapeake & Ohio railroad, to tidewater at Hampton Roads, Va., a distance of about 500 miles. Ultimately, it is expected to continue the line to one of the Great Lakes.

This line will traverse one of the best coking and steam coalfields of West Virginia, and will develop a large new territory. The road is being constructed in the most substantial manner; and with the exception of 8 miles of 25-ft. grade, there is nothing greater than a 0.2% or 7½-ft. grade between the coalfields and tidewater, giving the road practically a level grade throughout. A branch line is located down the Guyandotte river and may be extended to Huntington, W. Va. Rolling stock has been contracted for, part of which has been delivered.

The work under construction is estimated to cost about $36,000,000, and the whole system, exclusive of rolling stock and Lake terminals, will call for an expenditure of $50,000,000. H. H. Rogers is spoken of as holding the largest interest in the road, and associated with him is the banking house of Morton, Bliss & Co., also members of the Hewitt family. J. O. Green is president of the Deepwater company, and G. W. Imboden is vice-president. Of the Tidewater railway, Wm. N. Page is president and T. D. Rawson, vice-president. The general manager of both lines is Raymond Du Puy.

Foreign Mining News.

MEXICO.

SONORA.

Greene Consolidated Copper Co.—This company reports that the returns from its property at Cananea, during the past fiscal year, were the highest in the company's history. The production for the year was 64,211,895 lb. of bullion, having a gross value, including gold and silver contents, of $9,468,734, as against 56,239,672 lb. in the preceding year, of a gross value of $7,390,338, and 43,228,120 lb. in 1903, of a value of $5,706,192, and 12,586,841 lb. in 1902, having a value of $1,703,654, making a total production for the four years during which the company has been in operation of 86,376 tons of returnable fine copper, of a total value of $24,268,917.

The balance sheet as of July 31, 1905, shows total current liabilities (not including capital stock) of $1,517,278, as against which we have current assets of $2,605,252 and investments at Cananea of $15,213,873. The capital expenditures during the year were $852,995, as compared with $1,200,161 in the preceding year and $1,796,728 for the fiscal year ending July 31, 1903.

The average price received for copper sold during the year was 14.257c. per lb., the highest average monthly price being 15.077c. per lb, while the lowest monthly average was 12.671c. per lb. Six dividends, aggregating $1,900,800, were paid, as against $259,200 paid the preceding fiscal year and $432,000 in the year ending July 31, 1903, the company having paid a total of $2,812,000 in dividends to July 31, 1905.

Important improvements were completed during the year. When the additional betterments now under way are completed, they will materially increase the tonnage that can be handled and correspondingly lessen the cost per ton of treating ore. Although the amount of ore treated has been very largely increased during the past year, facilities for handling a larger tonnage have been provided and the mines are opened sufficiently to more than meet any demands made upon them.

Coal Trade Review.

NEW YORK, Oct. 11.

ANTHRACITE.

The hard-coal market shows no particular features; from now until winter it will respond only to weather conditions. During the short cold spell, a week ago, trade was brisk, but has now returned to its original quiet basis. The reported sale of Coxe Bros. & Co. to the Lehigh Valley Co. is denied by representatives in this city, although it was universally accepted by the regular press.

Prices remain as follows: $4.75 for broken and $5 for domestic sizes. Steam sizes: $3 for pea; $2.25@$2.50 for buckwheat; $1.45@$1.50 for rice and $1.30@$1.35 for barley, f. o. b. New York harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft-coal trade is strong; an active demand is taking all the coal that comes to tide, and not enough coal reaches the market to supply it. The prices on current business are advancing, and at this writing $2.65@$2.70, f. o. b. New York harbor shipping points, is paid for the ordinary steam grades, with a likelihood of a still further advance. All producers seem to be shipping to the extent of their productive capacity and their car supply. The railroads are giving quick transport to destination of all the coal that comes to them. Complaints are heard from some districts as to lack of cars, but most producers receive a fair quota, although possibly a little less than their demands. At present there are no blockades, although producers fear that such may occur if general freight is allowed to accumulate.

The hurricane season now being over, some vessels are offering to go south, of which shippers are trying to avail themselves whenever they can spare the coal to supply orders that have been waiting for this condition.

Trade in the Far East is active, and orders from that district are accumulating. The lack of light-draft vessels at all shipping points for the last two weeks has delayed a number of these orders, but brokers are asking such high rates for the few available vessels in port that deliveries are likely to wait for the arrival of more small vessels. Trade along the Sound is calling for more coal than can be allotted to it, and some consumers are forced to accept poorer grades and at advanced prices. Trade in New York harbor shows a short supply, with prices advancing. All-rail trade is calling for heavy shipments, but producers are slighting this in favor of tidewater trade. Car supply is fair, except in a few districts, where, however, a large proportion of the needs are supplied. Transportation is good, reaching schedule in most cases.

In the coastwise market, light vessels are scarce, but large ones are in good sup-

ply. We quote current rates of freight from Philadelphia: To Boston, Salem and Portland, 80c.; to Lynn, Newburyport, Gardner and Bangor, $1; to Portsmouth, 85c.; to the Sound, 70c.; to Saco, $1.10 and towages; to Bath, 85 cents.

COAL TRAFFIC NOTES.

The coal and coke originating on all lines of the Pennsylvania railroad east of Pittsburg and Erie were as follows for the year to Sept. 30, in short tons.

	1904.	1905.	Changes.
Anthracite	3,313,833	3,404,442	I. 90,609
Bituminous	20,017,816	21,725,597	I. 1,707,781
Coke	6,321,250	8,153,901	I. 1,832,651
Total	29,652,899	33,283,940	I. 3,631,041

The total increase this year was 12.2%, about one-half of it being in coke.

Shipments of anthracite coal in September are reported at 5,082,232 long tons, an increase of 1,114,632 tons over September, 1904.

For the nine months ending Sept. 30 the shipments are reported as follows:

	1904. Tons.	1904. Per Ct.	1905. Tons.	1905. Per Ct.
Reading	8,174,026	19.38	9,301,724	20.49
Lehigh Valley	6,870,073	16.29	7,446,881	16.41
N. J. Central	5,388,906	12.78	5,869,574	12.93
Lackawanna	6,802,813	16.13	6,939,033	15.29
Del. & Hudson	4,002,638	9.49	4,253 367	9.37
Pennsylvania	3,524,929	8.36	3,598,210	7.93
Erie	4,318,429	10.24	4,669,415	10.29
N. Y., Ont. & W	1,950,805	4.62	2,113.527	4.66
Del., Sus. & Schuyl.	1,141,149	2.71	1,196,079	2.63
Total	42,173,768	100.00	45,387,810	100.00

The total increase was 3,214,042 tons, or 7.6%, this year.

Birmingham. Oct. 9.

There is a steady production of coal in Alabama, though there has been a time when more coal was being mined.

The Sloss-Sheffield Steel & Iron Co. reports slow progress at the new Bessie mines in the western part of Jefferson county, on account of the scarcity of men. These mines will be modern in every respect, and the daily production will be over 1,500 tons. The mines of the Atlas Coal Co. at Oakman, in Walker county, will begin shipping coal by the middle of this month. A washer is being erected at this point, and before March it will be in operation.

There is a strong demand for coke, and the production is far from meeting all demands. The coal demand is steady. The shipments of the product out of the State are heavy. The railroads are handling the product without hesitation.

Pittsburg. Oct. 10.

Coal.—There is little change in the coal market, prices remaining firm on a basis of $1.10 a ton for run-of-mine at the mine. Owing to the car shortage, the mines are being operated irregularly, but production is equal to requirements, as lake shipments have fallen off considerably during the past week. The Pittsburgh-Buffalo Co. is preparing to sink shafts within 30 days on its property in Washington county, which is included in the Pittsburg district. The coal will not be put on the market, but will be used in making coke. Engineers are at work on a big coke plant, which is expected to be put in operation within a year. John Mitchell, president of the United Mine Workers, was in Pittsburg on Saturday, and went to Elizabeth, where a large mass meeting of miners was held. Operations were suspended in that field in order to give the men an opportunity to meet their chief. Fully 5,000 were present. The most significant statement made by President Mitchell was that, when the present agreements expire, there will be no reduction in wages without a fight.

Connellsville Coke.—Prices are advancing for future delivery, but for immediate shipment, strictly Connellsville furnace coke is held firmly at $2.50 a ton, and foundry at $3 a ton. It is reported that some contracts for furnace coke have been made for delivery next year at $2.75, and that $3 will be the price before the end of this year for delivery in 1906. The production in the Connellsville region last week amounted to 260,829 tons, an increase of nearly 1,000 tons over the previous week. The shipments aggregated 11,369 cars, distributed as follows: To Pittsburg and river points, 4,185 cars; to points west of Pittsburg, 5,997 cars; to points east of Everson, 1,220 cars. The shipments from the Masontown field amounted to 67,984 tons, and the total shipments from both fields for the week aggregated 332,253 tons.

Foreign Coal Trade.

Oct. 11.

Exports of coal and coke from the United States for the eight months ending Aug. 31 are reported by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904.	1905.	Changes.
Anthracite	1,620,266	1,574,721	I. 45,545
Bituminous	4,057,250	4,549,837	I. 492,587
Total coal	5,677,516	6,124,558	I. 447 042
Coke	352,774	396,140	I. 43,366
Total	6,030,290	6,520,698	I. 490,408

The coke went chiefly to Mexico, with some shipped to Canada also; the latter being taken by blast-furnaces in Ontario. The coal exports were delivered as follows:

	1904.	1905.	Changes.
Canada	4,297 444	4,679,455	I. 382,011
Mexico	621.908	591,520	D. 30,388
Cuba	295,301	323,229	I. 27,928
Other West Indies	176,556	196,955	I. 20,399
France	9,770	3 156	D. 6,614
Italy	65.462	56,952	D. 8,510
Other Europe	45,467	17,726	D. 27,741
Other countries	165,608	255,565	I. 89,957
Total	5,677,516	6,124,558	I. 447,042

The greater part of the exports are to adjacent countries—Canada, Mexico, Cuba and the other West Indies. The coal to other countries goes principally to South America. Exports to Canada in detail were as follows:

	1904.	1905.	Changes.
Anthracite	1,600,289	1,552,752	D. 47,537
Bituminous	2,697,155	3,126,703	I. 429,548
Total	4,297,444	4,679,455	I. 382,011

Shipments to Canada were 98.5% of all the anthracite exports, and 68.7% of the bituminous, this year.

Imports of coal into the United States for the eight months ending Aug. 31 are reported by the Bureau as follows:

	1904.	1905.	Changes.
Canada	809,210	859,870	I. 50 660
Great Britain	56,827	30,691	D. 26,136
Other Europe	50	212	I. 162
Japan	39,876	41,636	I. 1,760
Australia	146,155	108,438	D. 37,727
Other Countries	980	38	D. 942
Total Coal	1,053,108	1,040,885	D. 12,223
Coke	.....	29,165	I. 29,165
Total	1,053,108	1,070,050	I. 16,942

Coke was not reported separately last year. It comes chiefly from British Columbia, with a little from Germany.

Of the coal imported this year, 9,825 tons were classed as anthracite; the balance was bituminous. With the exception of some Nova Scotia coal, which comes to Boston, the imports from Canada were British Columbia coal, received at California ports. There was a large decrease this year in Australian coal, which comes to California. Nearly all the Japanese coal is received in Manila.

Iron Trade Review.

NEW YORK, Oct. 11.

The markets are a little more quiet this week, although there is still a considerable rush to buy. In pig iron there is a decided advance in prices, partly due to the active demand, and partly to the higher prices asked for coke. The advance in coke is general, and the furnaces will have to pay it on next year's contracts; this will be an important item in costs. There is, apparently, very little iron of any kind for sale for delivery this year. Basic pig is especially scarce, and premiums are being paid by those who need iron soon.

In finished material, the rush continues for structural steel and plates. Billets are in demand, and no attention is paid to the pool prices. The rail mills are now assured of full employment for at least the first half of 1906, and orders continue to come in.

In some quarters an effort is being made to hold down the market and prevent too rapid a rise in prices. The upward movement, however, seems too strong to be checked at present.

Exports and Imports.—Exports of iron and steel, including machinery, from the United States for August and the eight months ending Aug. 31, are valued by the Bureau of Statistics of the Department of Commerce and Labor as follows:

	1904.	1905.	Changes.
August	$10,430,331	$12,566,980	I. $2,136,649
Eight months	81,415,122	90,772,917	I. 9,367,795

The increase in August was 20.4%; the gain in eight months was 11.5%. The chief items of the iron and steel exports for the eight months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	27,654	33,763	I. 6,109
Billets, Blooms, etc.	236,451	126,524	D. 109,927
Bars	38,247	36,133	D 2,114
Rails	210,321	190,068	D. 20,253
Sheets and plates	26,810	46,276	I. 19,466
Structural steel	31,153	50,004	I. 18,851
Wire	73,081	89,865	I. 16,784
Nails and spikes	27,084	33,657	I. 6,573

Exports of iron ore were 74,332 tons in 1904, and 131,944 tons in 1905; an increase of 57,612 tons.

Imports of iron and steel, including machinery, into the United States were valued as follows for August and the eight months ending Aug. 31:

	1904.	1905.	Changes.
August	$1,757,715	$2,318,502	I. 560,787
Eight months	14,760,468	17,411,450	I. 2,650,982

The increase for August was 31%; the gain for the eight months being 18%. The chief items of the imports for the seven months were as follows, in long tons:

	1904.	1905.	Changes.
Pig iron	52,536	127,215	I. 74,679
Billets, blooms, etc.	8,202	9,540	I. 1,338
Bars	14,656	22,946	I. 8,290
Rails	34,229	11,867	D. 12,362
Wire-rods	10,732	11,334	I. 602
Tin-plates	49,241	50,328	I. 1,087

Imports of iron ore for the eight months were 241,585 tons in 1904, and 588,526 tons in 1905; an increase of 346,941 tons. Imports of manganese ore were 41,687 tons in 1904, and 186,206 tons in 1905; an increase of 144,519 tons this year.

Birmingham. Oct. 9.

The pig-iron market in Alabama has been so active of late and so many orders have been offered and accepted that several of the manufacturers in this territory have been forced to withdraw from the market and will only consider such special business, if any at all, as they see fit to handle. It is given out with authority that three-fourths of the probable make for the first quarter of the coming year has been sold ahead and those who desire to can still sell. Quotations have advanced from $12.50 to $13 per ton, No. 2 foundry, the last $12.50 iron being sold on Thursday of the past week. The sales during the first week in this month by those who were in the market aggregate well. The Alabama Consolidated Coal & Iron Co. has been out of the market since the first of the past week. After accepting orders agregating between 44,000 and 51,000 tons of iron on Thursday the Sloss-Sheffield Steel & Iron Co. withdrew from the market and notice is given that there will hardly be any business accepted for the balance of the month. This company sold in September 115,000 tons of iron and something like 100,000 tons this month. The production of the company is about 35,000 tons a month, so that delivery for six months is intended on orders already in hand. The Tennessee Coal, Iron & Railroad Co. is accepting business very cautiously, while the Lacey-Buek, the Woodward Iron Co., the Tutweiler Co. and other producers are not strong at all in the market as far as being able to accept business.

The following quotations for iron are given in this district: No. 1 foundry, $13.50; No. 2 foundry, $13; No. 3 foundry, $12.50; No. 4 foundry, $12; gray forge, $11.50; No. 1 soft, $13.50; No. 2 soft, $13.

The resumption of work at the Birmingham rolling mills of the Republic Iron & Steel Co., this week, after an idleness of nearly a year, means a larger need for iron in the home market.

Chicago. Oct. 9.

Continued heavy buying characterizes the market, with prices advancing. Pig iron is undoubtedly advancing from week to week. Coke is in strong demand, with light supplies, and high prices asked on contracts, in the expectation that there will be continued car shortage through the winter.

Northern iron has advanced 25c.@50c. on most sales, and No. 2 for the first half of 1906 is selling at $17@$17.50. There is little or no Northern iron to be had for the rest of this year. Southern is quoted on actual sales at $13@$13.50 Birmingham, for No. 2, or $16.65@$17.15 Chicago. The higher quotations probably will be minimum ones by the end of this week. Lake Superior charcoal iron is in strong demand at $18@$18.50, with little in the market.

The advance in coke is due partly to heavy demand from users and partly to restricted shipments said to be due to the lack of cars. Connellsville brings $5.65, an advance over last week of 25c., and standard cokes are 25c.@50c. lower.

Cleveland. Oct. 10.

Iron Ore.—Ore shipments to Oct. 1 were 25,473,606 tons, an increase of 11,851,168 over the movement for the same period a year ago. The shipment down the lakes in September amounted to 4,425,550 tons, against 4,006,442 for September, 1904. Vessel men having contracts with shippers have, during the past week, been notified that they are short on their contract movement and urged to make the shipment complete. This indicates that the shippers are to make little use of wild boats during the fall. The rates are unchanged, being based on 75c. from Duluth to Ohio ports.

Pig Iron.—There is little foundry iron left for sale for this year's delivery and prices are advanced to $15.50@$16; the latter being charged when deliveries are beyond the end of the year. Advance buying is now becoming general and sales into next year are large. There promises to be a shortage of malleable iron before the year is out. Some material has sold at $16 for quick shipment and other lots have sold as high as $16 for advance delivery.

Finished Material.—Sheet consumers are willing to contract, and in some instances small mills are taking large orders. A disposition has been disclosed, however, on the part of the large mills, to push the smaller mills out of business by advancing the prices of sheet-bars and billets. The demand for bar iron is good and the price is on the advance. The general quotation now is 1.75c. Youngstown, although some of the smaller mills are selling at 1.70c. Youngstown still. The plate trade is increasing in strength, but a supply coming from the Eastern mills prevents a shortage. Billets and sheet-bars are at a premium and hard to get.

New York. Oct. 11.

Pig Iron.—Business has been active, and a number of sales are reported. Prices are again stronger, and there is pressure for deliveries. Southern iron is now held at $13, Birmingham, for No. 2; an advance of 50c. per ton.

For Northern iron in large lots we quote: No. 1X foundry, $17.50@$18; No. 2X, $17@$17.50; No. 2 plain, $16.50@ $17; gray forge, $15.50@$16. Basic iron has been in strong demand and there is a sharp rise in prices. Northern is held at $17; Southern at $17@$17.50. Southern iron on dock is held at an advance, as follows: No. 1 foundry, $16.50@$16.75; No. 2, $16.25@$16.50; No. 3, $15.75@$16; No. 4, $15.25@$15.50; No. 1 soft, $16.50@ $16.75; No. 2 soft, $16.25@$16.50; forge, $14.50@$14.75.

Warrant sales have been light, with a little higher range of prices.

Cast-Iron Pipe.—Business continues good. Quotations are still nominally $27 per net ton, carload lots at tidewater, for 6-in. pipe; but higher prices are asked on new orders.

Bars.—Business is good. Iron bars are 1.745c., tidewater, for plain, and 1.795c. for refined. Steel bars are 1.745c., tidewater. Store trade is good, with 2.25c. the current price. Meetings of the pools will be held shortly, and higher prices are possible.

Plates.—Steel plates are still scarce for early delivery. Tank plates are 1.745@ 1.825c.; flange and boiler, 1.845@1.945c.; universal and sheared plates, 1.745c. up, according to width.

Structural Material.—Small orders continue to come in, and the mills will not guarantee deliveries. Prices are unchanged. Beams under 15-in. are 1.845c. for large lots; over 15-in., 1.895c.; angles and channels, 1.845c., tidewater delivery.

Steel Rails.—No change in standard sections. Light rails are in demand and firm,

prices ranging from $22.50 for 35-lb., up to $27.50 for 12-lb. rails.

Old Material.—Demand is strong and prices are generally higher. No. 1 railroad wrought is $21@$22; No. 1 yard wrought, $19@$19.75; machinery cast, $13.75@$14.25; heavy steel melting scrap, $16@$16.50. These prices are on cars, Jersey City or other terminal delivery. A sale of old steel rails for re-rolling is reported at $17.35, delivered on line of railroad.

Philadelphia. Oct. 12.

Pig Iron.—A rather excited market exists at the present time, especially with reference to basic, in which large transactions have been closed within a day or two. A good deal of this business is still pending. There is considerable activity in all other kinds of pig iron. The estimated amount wanted runs closely to 150,000 tons of all kinds. Foundry iron is still active, especially No. 2. Negotiations are in progress this week with Alabama companies, but it is understood that there is some uncertainty as to the outcome on account of the urgency of delivery demanded. Mill irons are also doing well, but the amounts purchased are small in comparison with other kinds. Quotations may be given approximately as follows: No. 1X foundry, $18; No. 2X foundry, $17.25; No. 2 plain, $16.75; No. 2 Southern, $16.75; standard forge, $15.50 to $16; basic, $17; low phosphorus, $22.

Billets.—Ordinary steel is quoted at $28 and special steels range from $30 to $35. Very heavy sales have been made.

Muck-Bars.—Muck-bars have sold in small lots at $28 and more orders could be had if $27.50 were accepted.

Merchant Bar.—Business is being done in a satisfactory way on a basis of 1.73½c., although premiums are paid for prompt delivery where possible. Steel bars are fairly active.

Sheets.—All our mill people report as much business coming along as they can take care of. Store prices have been advanced for immediate delivery.

Pipes and Tubes.—The consumption of tubes continues to be very heavy. Discounts on carloads for iron tubes are 41% for 1-in. pipe and 44% for steel.

Merchant Steel.—The consumption of merchant steel in this market has improved and several fair-sized orders have been placed.

Plates.—It is simply impossible to keep up with the demand for plates, both iron and steel. A great deal more business is being offered than is accepted.

Structural Material.—Prices have advanced for special accommodations and buyers are glad to secure the acceptance of their orders on almost any terms.

Steel Rails.—Some excitement prevails in the steel-rail market in consequence of the unexpected inquiry from several quarters for steel rails, for delivery next year. The actual orders placed since last week are rather unimportant.

Old Rails.—Old rails are being picked up once more. Brokers can dispose of everything they can command at about $22.50.

Scrap.—All kinds of scrap have begun to move more freely and the scrap dealers are having their own way as to prices excepting for such stuff as cast borings, stove plates and forge fire-scrap. Choice railroad scrap is bringing $21.50 and snapped up at that. No. 1 steel scrap is held at $16.50 and phosphorus scrap sold at $21 with as much as $1 more asked. Machinery scrap is held at $16 per ton.

Pittsburg. Oct. 10.

The pig-iron market has been less active during the past few days as to sales, but prices are firmer, and in foundry iron there has been a stiff advance. No. 2 foundry is held at $15.50, Valley furnaces, or $16.35, Pittsburg. Some furnaces are asking $16, Valley. The minimum price of bessemer pig iron has been firmly established at $15.50, Valley furnace, but a few small lots for immediate shipment sold during the week at $15.25. Some sales of basic iron have been made and the price has advanced to $16.10, Pittsburg. The Standard Sanitary Manufacturing Co. is in the market and may close today for a large tonnage of foundry iron. This interest has just bought 2,000 tons of Southern iron for its Louisville plant, paying $12.50, Birmingham. This rate is equivalent to $16.35, Pittsburg, which from present indications will be the market within a few weeks. The United States Steel Corporation has not yet bought the bessemer iron it is expected to take for shipment this month, but it is regarded here as certain that it will buy 40,000 tons or more before the end of the month and that the price will not be less than $15.50, Valley furnaces. The Westinghouse interests have added about 5,000 tons of foundry iron to the recent purchases, but the price is not given. There are a number of inquiries for all grades of pig iron for delivery next year, and one or two important contracts are likely to be closed this week. An effort is apparently being made by some interests to keep prices down. The sales made at low prices are mentioned as the ruling rate and not the quotations made by producers, who refuse to sell at less than the prices named. While several sales of foundry No. 2 have been made at $16.10 and $16.35, Pittsburg, it is reported that last Friday one concern bought 600 tons at $15.85, Pittsburg.

There have been some changes in prices in merchant pipe and tin-plate, but the market remains about the same. In other lines of finished steel products the demand continues heavy and all the mills in this district are busy, with orders booked that will keep them running steadily for months. The scarcity of billets continues, but the largest sale in several weeks has just been recorded. It was 5,000 tons of bessemer billets at $25.50, but that price cannot be duplicated. Open-hearth billets are quoted nominally at $26. It is difficult to quote the actual price of tin-plate. On December 22 the American Sheet & Tin-Plate Co. fixed the price at $3.55 a box, but has not adhered strictly to that rate, and it is known that the sales during the past eight months have not averaged much more than $3.40 a box. Last week it is reported the company re-affirmed the $3.55 rate, but established new discounts which makes the inside price from 20 to 25c. less. The independents are not following the price established by the leading interest and all seem to have plenty of business. The National Tube Co. has revised its official discounts and is now quoting prices that actually prevail. Some new business is being booked, and the pipe trade is in better shape than it has been for some time. The sheet market, which has been weak, also shows some signs of improvement, but prices remain about the same. A strong effort is being made by the indepent sheet and tin-plate interests to get together. It is likely a meeting will be held here this week, the matter having been left to a special committee. It is reported that the American Sheet & Tin Plate Co. has just closed a contract with the Standard Oil Co. for 1,000,000 boxes of tin-plate for the export trade. While the report has not be confirmed, it has not been denied. Buying of wire products has been very heavy since the revision of prices last month, and an advance of $1 a ton has just been ordered. Tonnage in all other finished lines continues good and nearly all the mills are behind in deliveries.

Pig Iron.—Sales during the week have not been as heavy as the previous week, but for all grades the tonnage probably reached 25,000 tons. Bessemer has sold at $15.25, Valley furnaces, but $15.50 is named as the minimum price for deliveries extending through the quarter. While one sale of foundry No. 2 was made last week at $15.85, Pittsburg, other sales were at $16.10 and $16.35, and some of the leading independent interests refuse to sell at less than $16.35. Gray forge is higher this week, being quoted at $15.15@$15.35, Pittsburg.

Steel.—One sale of 5,000 tons of bessemer billets was made during the week at $25.50, but this price could not be duplicated. Open-hearth billets are quoted nominally at $26@$27; sheet-bars and tin-plate bars are quoted at about the same figure, but no sales are recorded. Merchant steel bars remain at 1.50c. and plates at 1.60c.

Sheets.—The market seems to be a trifle firmer, but prices are about the same as

last week, black sheets 2.30c, and galvanized 3.30@3.35 for No. 28 gauge.

Ferro-manganese.—The demand is good and 80% domestic is quoted at $54@$55 a ton.

Cartagena, Spain. Sept. 23.

Iron and Manganiferous Ores.—Messrs. Barrington & Holt report that shipments for the week were three cargoes, 9,020 tons manganiferous ore, to Great Britain. Sales have been numerous and consumers are keen on buying for forward delivery. The situation looks very promising for some time ahead. The iron ore shipped from Spain during the first seven months of this year shows an increase of 432,000 tons over the same period of 1904.

Active work is in progress to increase the loading berths in the port of Cartagena, and before the end of the year the quay extension will provide for two more steamers to lie at the wharf. Increased room is absolutely necessary owing to the large number of steamers which now load fruit from this port, in addition to the ore boats.

Quotations are unchanged. Ordinary 50% ore is 6s. 6d.@6s. 9d.; special low phosphorus, 6s. 10d.@7s. 8d.; specular ore, 58% iron, 10s. 3d.; S. P. Campanil, 9s. All prices are f. o. b. shipping port. Manganiferous ores, same terms, range from 10s. 6d. for 35% iron and 12% manganese, up to 17s. for 20% iron and 20% manganese.

Pyrites.—Iron pyrites, 40% iron and 43% sulphur, are quoted at 10s. per ton.

Heavy Chemicals and Minerals.

NEW YORK, Oct. 11.

The market for heavy chemicals holds even and firm, with no special features. American sulphur is firm on the basis of adjustment as outlined in the statement of last week's issue. We note herewith the prices for the American product. Sicilian is quoted the same for Atlantic ports as the domestic product.

Pyrite continues unchanged and in steady demand.

Sulphate of copper holds at about the same figure.

Nitrate of soda reports advances which are considerably higher for arrival, as noted herewith.

Phosphate companies report the same quotations, with firm markets, and freights high, and almost impossible for near-by shipments.

PRICES.

Sulphur.	
Louisiana, N. Y., Boston or Portland ....ton	$22.125
Philadelphia or Baltimore..... "	22.625
Pyrite.	
Domestic, furnace size.....Unit	11c
Fines..... "	10c.
Imported, lump, At. ports..... "	10@11c.
" fines " " ..... "	9½@10c.

Pyrite prices are per unit of sulphur. On lump deliveries, a charge of 25c. per ton is made for breaking to furnace size.

Acids.	
Boric, crystals.....per lb.	.10
powdered..... "	.10½
Carbonic, liquid gas..... "	.12½
Hydrofluoric, 30%..... "	.03
48%..... "	.05
60%..... "	.11
Nitric acid, 36°, 100 lb.....	$4.75
38°, 100 lb.....	5.25
40°, 100 lb.....	5.50
42°, 100 lb.....	5.75
Oxalic acid, com'l, 100 lb.....	$5.00@ 5.25
Sulphuric acid, 50°, bulk, ton.....	13.50@14.50
60°, 100 lb. in carboys..	1.05
60°, bulk, ton.....	18.00@20.00
66°, 100 lb. in carboys..	1.20
66°, bulk, ton.....	21.00@23.00
Blue Stone (Copper Sulphate), car-load lots, per 100 lb.....	$5.30
Nitrate of Soda, 100 lb.....	2.25@ 2.30
Sulphate of Ammonia, per 100 lb.....	3.10@ 3.15

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock.....	$7.25@7.50	$10.67@11.85
land pebble.....	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%.....	4.35@4.40	10.27@10.67
78%.....	3.75@4.00	.....
75%.....	3.40@3.50	.....
68@72%.....	3.00@3.25	.....
‡So. Car. land rock.....	3.75@4.00	.....
river rock.....	3.50@3.75	6.33@ 6.61
Algerian, 63@70%.....		7.04@ 7.71
58@63%.....		6.15@ 6.60
Tunis (Gafsa).....		6.00@ 6.60
Christmas Isle.....		13.28@14.11
Ocean Isle.....		13.60@14.45
Somme, Fr.....		11.39

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Metal Market.

New York, Oct. 11.

Gold and Silver Exports and Imports.

At all United States Ports in August and Year.

Metal.	August.		Year.	
G'ld	1904.	1905.	1904.	1905.
Exp	$10,762,818	$274,153	$80,295,460	$41,265,017
Imp	7,764,491	3,146,223	64,453,635	24,699,625
Exc	E. $2,998,327	I. $2,872,070	E.$15,841,825	E$16,565,392
Silv.				
Exp	4,848,922	4,549,485	85,751,145	33,915,751
Imp	2,517,578	2,316,162	17,674,195	20,437,438
Exc	E. $2,331,354	E. $2,233,323	E.$18,076,950	$13,478,313

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce of Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending October 7, and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week.....	$2,000	$2,744,825	$603,916	$54,227
1905.....	32,291,943	5,835,360	27 028,737	3,605,561
1904.....	73,177,464	4,228,549	29,775,974	756,774
1903.....	31,423,005	6,561,429	22,976,416	2 972,185

Exports of silver for the week went chiefly to Great Britain. Imports of gold were from France, England and Germany; of silver from Mexico and South America.

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
New York Associated.....	$195,038,400	.....
England.....	161,504,720	.....
France.....	587,978,110	$212,942,160
Germany.....	137,285,000	45,765,000
Spain.....	74,745,000	113,370,000
Netherlands.....	32,988,500	30,173,500
Belgium.....	15,900,000	7,950,000
Italy.....	123,895,000	16,118,500
Russia.....	574 660,000	26,255,000
Austria.....	227,715,000	61,190,000

The returns of the Associated Banks of New York are of date Oct. 7, and the others Oct. 6. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York.

The statement of the New York banks —including all the banks represented in the Clearing House—for the week ending Oct. 7 gives the following totals, comparison being made with the corresponding week of 1904.

	1904.	1905.
Loans and discounts....	$1,145,989,200	$1,059,740,900
Deposits.....	1,205,276,000	1,059,261,700
Circulation.....	41,791,000	54,142,400
Specie.....	237,503,500	195,038,400
Legal tenders.....	76,452,400	74,063,200
Total reserve	$313,955,900	$269,101,600
Legal requirements....	301,319,000	264,815,425
Balance surplus.....	$12,636,900	$4,286,175

Changes for the week this year were an increase of $76,300 in circulation; decreases of $11,889,400 in loans, $6,467,600 in specie, $1,987,100 in legal tender, $21,203,400 in deposits, and $3,153,850 in surplus reserve.

Shipments of silver from London to the East for the year up to Sept. 28 are reported by Messrs. Pixley & Abell, as follows:

	1904.	1905.	Changes.
India.....	£7,606,998	£4,455,321	D.£3,151,677
China.....	372,722	758,688	I. 385,966
Straits.....	58,103	11,675	D. 46,428
Totals.....	£8,037,823	£5,225,684	D.£2,812,139

Imports for the week this year were £133,000 from New York and £3,000 from Australia; a total of £136,000. Exports for the week were £53,200 bar silver and £57,000 in Mexican dollars; a total of £110,200, all to India.

Indian exchange has been steady, and all the Council bills offered in London were taken at an average of 16.03d. per rupee. The Indian Government is reported to be buying silver for coinage purposes.

The movement of gold in Great Britain for the eight months ending Aug. 31 is reported as follows:

	1904.	1905.
Imports.....	£21,309,416	£26,768,177
Exports.....	16,605,744	18,106 154
Excess imports.....	£4,703,672	£8,662,023

There was an increase of £3,958,351 in the net imports of gold this year. The movement of silver for the eight months was as follows:

	1904.	1905.
Exports.....	£9,550 294	£9,509.636
Imports.....	8,502,494	8,882,204
Excess, exports.....	£1,047,800	£627,432

This shows a decrease of £420,368 in the net exports. Of the silver imported this year the sum of £6,315,043, or 65.4% of the total, is credited to the United States

Silver has been very steady with moderate offerings. Demand has kept pace with the supply, and has been stimulated somewhat by the increased demand from manufacturers for the fall trade.

SILVER AND STERLING EXCHANGE.

Oct.	Sterling Exchange.	Silver New York, Cents.	Silver London, Pence.	Oct.	Sterling Exchange.	Silver. New York. Cents.	Silver. London, Pence.
5	4.85⅜	61⅛	28⅛	9	4.8520	61⅛	28⅛
6	4.85⅜	61⅛	28 7/16	10	4.8525	61⅛	28⅛
7	4.8520	61⅛	28 9/16	11	4.8530	61⅛	28 7/16

New York quotations are for fine silver, per ounce, Troy. London prices are for sterling silver, .925 fine.

NOTE—The price of silver in London on Oct. 4 should have been 28⅜d., and not 28¾d., as printed.

Prices of Foreign Coins

	Bid.	Asked.
Mexican dollars..	$0.47	$0.49
Peruvian soles and Chilean pesos..	.43	.45
Victoria sovereigns	4.85½	4.87½
Twenty francs.	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

Daily Prices of Metals in New York.

October.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
5	16 @16⅛	16 @16⅛	71⅛	32⅛	4.85	5.95 @6.05	5.80 @5.87½
6	16 @16⅛	16 @16⅛	71¼	32½	4.85	5.95 @6.05	5.80 @5.87½
7	16 @16⅛	16 @16⅛	....	32½	4.85	5.95 @6.05	5.80 @5.87½
9	16 @16⅛	16 @16⅛	71	32	4.85	5.95 @6.05	5.80 @5.87½
10	16 @16⅛	16 @16⅛	70¾	32⅛	4.85	5.95 @6.05	5.80 @5.87½
11	16 @16⅛	16 @16⅛	70⅛	32¼	4.85	5.95 @6.05	5.80 @5.87

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic.

NOTE—Through an error in proofreading, the price of electrolytic copper was misstated in our table last week for Sept. 28 and 29. On those dates it should have been 16⅛@16¼, instead of 16@16¼, as given. The table should read, in the electrolytic column: Sept. 28, 16⅛@16¼; 29, 16⅛@16¼; 30, 16⅛@16⅜c. The remaining figures were correct.

Copper.—The market has been very quiet during the week. Consumers are entirely covered for this year and are not inclined at this time to place additional orders for 1906. The market therefore closes nominal at 16@16½c. for Lake and electrolytic, and 15⅝@16⅛c. for casting copper.

The movements in the standard market have had a narrow range and were slightly reactionary, the quotation at the close being £70 18s. 9d. for spot and £70 5s. for three months.

Refined and manufactured sorts we quote: English tough, £74@£74 10s.; best selected, £75 10s.@£75 15s.; strong sheets, £84; India sheets, £79; yellow metal, 6⅞d.

Exports of copper from New York for the week were 4,104 tons. Our special correspondent reports the exports from Baltimore for the week at 957 long tons of fine copper.

Tin.—The London market has undergone violent fluctuations during the week, breaking sharply upon the announcement of the Dutch government that the Banka sales during the coming year would be increased to the extent of 2,000 tons. The lowest prices touched were £145 15s. for spot and £144 12s. 6d. for three months, but there has been a recovery since, the close being firm at £147 2s. 6d. for spot and £146 5s. for three months.

The market here has followed closely the changes abroad and closes firm at 32@32¼c., depending upon delivery.

Lead.—The demand keeps up at a satisfactory rate and prices are unchanged at 4.85 New York and 4.77½ St. Louis.

The London market shows great firmness and has advanced to £14 2s. 6d. for Spanish and £14 15s. for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is strong and fairly active. Latest sales here are on a basis of 4.90@4.92½c. East St. Louis for Missouri brands.

Spanish Lead Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of Sept. 23, that silver has been 15 reales per ounce; exchange is 33 pesetas to £1. Local price for pig lead is 75 reales per quintal, equal, on current exchange, to £12 14s. 3d. per long ton, f. o. b. Cartagena. Shipments for the week were 305 tons argentiferous and 128 tons desilverized lead, all to Marseilles.

Spelter.—A good volume of business is being done right along, but the quantities involved have not been large enough to materially affect the price. Quotations at the close are unchanged at 5.95@6.05 New York and 5.80@5.87½ St. Louis.

Owing to the conditions dwelt upon in our last issue, the London market has still further advanced, closing firm at £28 for ordinaries and £28 5s. for specials.

Zinc Sheets.—Sheet zinc is quoted at $7.50 per 100 lb. (less discount of 8%), f. o. b. cars Lasalle and Peru, in 600-lb. casks, for gauges No. 9 to 22, both inclusive, widths from 32 to 60 in., both inclusive, and lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since January 1, 1905, have been as follows: December 30, 1904, $7.25; January 7, 1905, $7.50; May 12, $7.25; June 1, $7; July 29, $7.25; August 10, $7.50. The demand is reported active.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is firm at 5.87½c., and while latest sales are on that basis quite a number of sellers ask 5.90c. and even higher for prompt and future metal.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 23, that prices are unchanged, at 80 fr. for blende, 35% zinc, and 60 fr. for calamine, 30% zinc. Shipments for the week were 3,100 tons blende to Antwerp.

Antimony is unchanged, the quotation being 12@13c., depending upon brands and deliveries.

Nickel.—Quotations for large lots, New York or other parallel delivery, are 40@47c. per lb., according to size and condition of order. For small quantities, prices range from 48 up to 60c., also according to size of order and deliveries.

Platinum.—Quotations are firm at $20.50 per oz. Gas-engine sparking points vary from 87c. for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated wire, 90c.; and cones, $1 per gram.

Quicksilver.—The market is quiet. The New York quotation is $40 per flask of 75 lb. for large orders, and $40.50@$41 for small lots. San Francisco prices hold steady at $39 for domestic orders, and $37.50@$38 for export business. The London market is unchanged, £7 2s. 6d. being quoted both by first hands and jobbers.

Minor Metals.—For minor metals and their alloys, wholesale prices are f. o. b. works:

Aluminum.	Per lb.
No. 1, 90% ingots	33@37c.
No. 2, 99% ingots	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze	20@23c.
Nickel-alum..	33@39c.
Bismuth	$2.10
Cadmium, f. o. b. Hamburg	77c.
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	20c.
Magnesium, pure (N. Y.)	$1.60
Manganese (98@99% N. Y.)	75c.
Manganese Cu. (30@70% N. Y.)	40c.
Molybdenum (98@99% N. Y.)	$1.75
Tantalic acid (N. Y.)	50c.
Thallium, f. o. b. Breslau, Germany.	65@70c.
Phosphorus, foreign	45c.
Phosphorus, American	70c.
Tungsten (best), pound lots	90c.

Variations in prices depend chiefly upon the size and condition of orders.

Missouri Ore Market.

JOPLIN, Oct. 7.

The highest price reported paid for zinc ore was $55 per ton for three bins of the

choicest ore, the same price as paid last week. While there was no change in the price for the choicest ore several bins of medium grades were advanced $1 per ton, the assay basis ranging from $49 to $52 per ton of 60% zinc, while a few bins sold on straight bids equivalent to a basis price of $53 per ton of 60% zinc. Silicate zinc ores sold from $19 to $31 per ton and the average of all grades was $47.20 per ton.

Continued dry weather is affording an opportunity for the last of the mines flooded last July to become drained and the output is steadily increasing, being now for the first time equal to the output before the July floods set in. The shipment of zinc ore for the week was large, being 560 tons above an average.

Lead is still quoted firm at $63.50 per ton for the choicest bins, and $63 per ton for 80% grades, an average for all grades of $62.72 per ton, local smelters still taking the entire output each week.

The district value of both ores for the 40 weeks of this year exceed by $2,004,070 the value of the two ores for the corresponding period of last year, despite a decrease of 4,683 tons of zinc and 1,398 tons of lead in this year's shipment. Prices have averaged for this year at $44.26 for zinc and $58.78 for lead, against $33.90 for zinc and $55.36 for lead the 49 weeks of last year.

Following are the shipments of zinc and lead ore from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Carterville-Webb City..	3,179,140	723,880	$97,400
Joplin.....	2,694,510	238,190	74,860
Duenweg..	808,880	114,240	22,600
Galena-Empire.....	806,930	116,610	22,230
Aurora.....	870,040	22,570	17,050
Alba.....	456,840	.....	11,870
Neck City.....	441 180	.....	11,470
Badger-Peacock	317,860	7,200	7,860
Prosperity.....	265,120	37,150	7,400
Baxter Springs.....	245,190	46,830	7,000
Oronogo.....	109,760	37,870	3,800
Sherwood.....	120,940	3,220	3,000
Zincite.....	83,840	4,130	2,220
Central City.....	83,610	.....	1,920
Carthage.....	67,050	.....	1,750
Beef Branch.....	60,190	14,430	1,160
Diamond.....	48,450	.....	1,160
Reeds.....	44,900	.....	1,070
Wentworth.....	45,230	.....	990
Stott City	34,870	.....	770
Spurgeon.....	15,420	13,230	650
Totals.....	10,800,590	1,379,350	$298,230
40 weeks.....	387,257,370	47,350,690	$10,082,355
Zinc value, the week,	$254,970; 40 weeks		$8,680,555
Lead value, the week,	43,260; 40 weeks		1,401,800

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months:

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1904.	1905.	Month.	1904.	1905.
Jan.....	33.33	52.00	Jan.....	55.55	61 50
Feb.	33.63	52.77	Feb.	56.37	57.62
March.....	35.40	47.40	March.....	57.20	57.20
April.....	35.75	42.88	April.....	58.00	58.00
May....	34.87	43.31	May.....	57.77	58.27
June.....	32.93	40.75	June.....	56.60	57.80
July.....	33.37	43.00	July.....	53.00	58.00
August.....	37.55	48.83	August.....	53.00	58.00
September.	40.18	46.75	September.	53.50	63.50

Wisconsin Ore Market.

PLATTEVILLE, Oct. 6.

The present condition of the zinc-concentrate market in this district is highly satisfactory to the producers. There is no material change in the price from those paid last week, the assay basis holding at $47 per ton for 60% zinc. The best grades bring a little higher price than they did last week, owing to the fact that the bins are pretty well cleaned up. Benton Camp reports the loading of 20 carloads of zinc and lead ore last week with an estimated value of $24,00. Lead remains steady, and the buyers report an increase in the output. Prices run $26@$28 per 1,000 lb. for lead ore.

Mining Stocks.

New York. Oct. 11.

Dear money and a pressure to sell have checked the bull movement in stocks this week, and the close shows some recession in prices. In the industrials this was especially apparent. United States Steel, however, was strong, closing at $37½ for the common and $104 for the preferred. At the close, there was some improvement in the market.

The copper stocks showed large dealings. Amalgamated Copper closed at $84½. In the outside market, British Columbia sold at $8@$8¼; Granby Consolidated, $8; Tennessee Copper, $35; Utah Copper, $23½. Greene Consolidated sold down to $25¾ per share.

On the Consolidated Exchange, Brunswick showed sales at 39c. Some interest was taken in the Tonopahs, sales of Sandstorm being reported at 60c.; Indiana Tonopah, 13c. Dealings in the Comstocks were light.

Boston. Oct. 10.

Although moderate reactions have followed the boom in mining stocks in this market the interest is not lessened materially, and it is expected that the future will witness higher prices. Higher money rates have mitigated against the market, but banks look more favorably upon this class of stocks than of yore. The trend has followed the New York market except for specialties, and profit taking has been quite general, yet the tone is good. There have been two important events the past week which have sent some stocks kiting. The striking of the Kearsarge lode in the Franklin Junior last Friday caused the stock to advance $2.75 that day to $19.75. Sales of almost 12,000 shares were made in sympathy. Rhode Island rose $1.87½ to $8.87½, with almost 10,000 shares traded in. Arcadian touched $5.37½, and Elm River $4 on large trading. The advance in the other stocks was on the theory that they might also benefit from this lode. The announcement that the Calumet & Hecla had purchased lands south of Portage lake caused a boom today in Isle Royale and Atlantic. The former rose $2 to $25.50, and the latter $1 to $28. Allouez also started up and rose $1.87½ to $41.87½. The Superior copper mine, which Calumet has taken an interest in, is immediately south of Isle Royale and is operating the Baltic lode.

The market here has been helped by buying orders from Western points and extra wires have been put in between here and Chicago to handle the business from the Lake district. Pittsburg and Duluth people have also been active here besides New York.

North Butte has continued active with fluctuations at times violent. Wednesday last, it varied from $58 to $55, while on Thursday it broke to $52.75 on the catching of stop orders. From this it rose to $54.75. For the week it closes $3.50 lower at $53. Tecumseh is less active, and slid off $2.25 to $12.87½, but it rallied to $14 today. Victoria has been well bought and is up 1.37½ to $7.37½, while Centennial fell $2.25 to $27, with subsequent recovery to $28.50. Adventure spurted $1.50 to $9.50, but reacted to $8.62½ today. Copper Range Consolidated touched $73.87½, but settled to $71.50. The Copper Range Co., a subsidiary company, declared its initial dividend of $1.50 last Thursday. This company possesses the title to 9,360 acres of land, 50,000 shares of Champion mining stock and all of the Copper Range railroad. Practically all of the stock has been exchanged for that of the Consolidated, yet the latter cannot possess the Champion dividend money except as the old Copper Range pays dividends.

Telegraph advices Saturday stated that 440 tons of Allouez rock were stamped that day, producing 21 tons of mineral, which is equivalent to 95.4 lb. of mineral or 66¾ lb. of refined copper to the ton. Central mining stockholders will get a dividend in liquidation as the property has been sold.

Trading has been active on the curb. Majestic is up to $2.87½ and St. Mary's Mineral Land sold at $64. Nevada Consolidated has sold at $6.25, Arizona Commercial at $18.50 and Ahmeek at $61@$61.50 per share.

Colorado Springs. Oct. 6.

Trading has been light during the past week on the local exchange and the quotations will average lower than one week ago. The output for the month of September amounts to $1,846,300. This is nearly up to the highest record, and the probability is that the year will equal, if not exceed, any previous one.

El Paso fluctuated considerably during the week, starting at about 80, selling down to 66 and recovering to 68c. Acacia has been traded in considerably and is

quoted today at 11½@11⅝c. Elkton remains at about 54c. Findley has been quite active around 74¼c. Portland is selling at the old price of $2.25. Isabella is quoted at 27½@28c. Anaconda is selling for 15c.; Cripple Creek Consolidated, 7¼c.; Jerry Johnson, 13½c.

The Golden Cycle Co. is planning a mill to cost $200,000 in all.

San Francisco. Oct. 5.

The Comstock shares have been rather dull and have shown some weakness in prices. Ophir hangs between $5.25 and $5.50, while Consolidated California & Virginia closed at $1.25; Mexican, $1; Hale & Norcross, $1; Caledonia, 43c. per share.

The Tonopah shares were more active, but not specially strong. Though buying was fairly good, prices were a little lower. Montana Tonopah sold at $2.75; Tonopah Midway, $1.50; Tonopah Belmont, $1.40; North Star, 53c.; Sandstorm, 50c. per share.

Oil stocks were quiet, with light sales. Monte Cristo closed at 74c.; Piedmont, 7c. per share.

Dividends.

Company.	Payable.	Rate.	Amt.
Amer. Smelting & Ref.	Oct. 16	$1.75	$875,000
Anaconda Copper	Oct. 19	1.25	1,500,000
B. & H.	Sept. 30	0 01	4,000
Bunker Hill & Sullivan	Oct 4	0.50	150,000
Central Coal & Coke	Oct. 15	1.50	76,875
Central Coal & Coke, pf.	Oct. 15	1.25	23,437
Penna. Salt Mfg. Co.	Oct. 16	3.00	60,000
Philadelphia Co.	Nov. 1	0.75	434,295
Tenn. Coal Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, Iron & R. R., pf.	Nov. 1	2.00	4,960
Va.-Carolina Chem., pf.	Oct. 16	2.00	360,000
Vulcan De-tinning, pf.	Oct. 20	1.25	18,750

*Monthly. §Bi-monthly. †Quarterly. ‡Semi-Annually.

Assessments.

Company.	Delinq.	Sale.	Amt,
Anaconda Tonopah	Sept. 23	Oct. 14	$0.02
Con. Imperial	Oct. 2	Oct. 26	0.01
Mexican	Oct. 30	Nov. 20	0.15
Potosi	Sept. 5	Oct. 16	0.10
Savage	Nov. 8	Nov. 29	0.10
Sheba Gold and Silver	Sept. 15	Oct. 16	0.02
Yellow Jacket	Oct. 17	Nov. 22	0.10

St. Louis. Oct. 7

	High.	Low.
Adams	$ .40	$ .25
American Nettie	.09	.07
Center Creek	2.00	1.50
Central Coal & Coke	66.00	64.50
" " " pfd.	80.00	77.50
Columbia	1.00	.25
Con. Coal	30.00	28.00
Doe Run	140.00	137.00
Granite Bimetallic	.20	.15
St. Joe	16.50	15.00

LONDON. (*By Cable.**) Oct. 10.

	£	s.	d.
Camp Bird	1	16	9
Consolidated Gold Fields	6	3	9
De Beers	18	0	0
Dolores	2	2	6
East Rand	7	3	9
El Oro	2	1	0
Esperanza	6	4	0 @ 6 5 0
Modderfontein	8	12	6
Rand Mines	8	7	6
Rio Tinto	67	5	0
Simmer and Jack	1	11	3
Stratton's Independence	0	9	3
Tomboy	1	10	6

*Furnished by Wm. P. Bonbright & Co., New York.

STOCK QUOTATIONS.

NEW YORK. Week Oct. 11.

Name of Company.	High	Low	Clg.	Sales
*Amalgamated	86½	83¾	85	168,040
Anaconda	125⅛	116	118¾	8,440
British Col. Copper	8⅝	8	8¾	3,600
Federal	121⅞	115⅛	121	3,450
Federal, Pf.	99	96	97½	8,212
Greene Copper	26⅛	25¾	26¾	17,000
Greene Gold	4⅜	4⅛	4¼	9,350
Mitchell	9	8	8⅝	15,500
Tennessee Copper	35	34	34¾	9,600
Union Copper	1⅜	1¼	1¼	5,300
United Copper	35	33	33¾	9,600
United Copper, Pref.	76½	75¾	76½	625
White Knob	1	½	¾	4 100

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	130¾	127⅛	129¼	165,900
Am. Smelting & Ref., Pf.	122⅞	121⅛	121⅞	4,120
Colorado Fuel & Iron	48¾	45⅛	46¾	61,050
Pittsburg Coal	15⅛	15⅛	15⅛	100
Republic I. & S.	25¾	24	25	42,250
Republic I. & S., Pf.	95½	93½	94½	16,245
Tenn. Coal & Iron	89⅜	86½	87⅝	17,260
U. S. Red. & Ref.	30	29	29½	500
U. S. Red. & Ref., Pf.	66	64⅜	65⅛	1,100
U. S. Steel	39	37¼	38	292,531
U. S. Steel, Pf.	105⅞	103⅜	104¾	102,270
Bethlehem Steel	30½	30	30¾	4,140
Standard Oil	672	652½	670	387

BOSTON.

Allouez	41⅞	39	41⅜	16 437
Amalgamated	86½	83⅞	85	16.078
Atlantic	28¾	25¾	27¾	33,533
Bingham	32	31	31	1,934
Boston Consolidated	9⅞	6⅝	9½	22,025
Calumet & Hecla	675	665	668	112
§Centennial	29⅜	27	28½	4,540
Mercur	.60	.56	.56	3,340
Copper Range	73⅞	71¼	72	12,052
Daly-West	15	14	14⅜	2,063
Franklin	19	16½	18⅛	20,489
Granby	8	7½	7⅞	4,257
Green Con. Copper	26⅝	25¾	26⅜	8,916
Isle Royale	25⅛	22¾	25¼	8,008
‡Mass	10½	9¾	10	1,055
Michigan	15¼	14	14½	3,062
Mohawk	60	55	57½	1,527
*North Butte	58	52¾	53	24,431
Old Dominion	27⅛	27	26½	795
*Osceola	109¼	107½	107½	2,027
*Parrot	27½	26½	26½	716
Phoenix	1¾	1⅝	1⅝	7,840
Quincy	108	104	104	190
Rhode Island	8⅝	6¾	8	21,119
Shannon	8½	7⅜	8⅜	6,205
Tamarack	134	126	127	385
Tecumseh	16⅛	12¾	12¾	13,127
United Copper, com.	34¾	33⅜	33¾	5,705
United States	38	36¾	36⅝	7,238
Utah	47½	46½	47	3,356
Wolverine	120	118	120	324

PHILADELPHIA.

Cambria Steel	29⅝	28½	28½	7,150
Philadelphia Co.	49½	48¼	49	18,967
Tonopah	13¼	13	13⅛	2,330

PITTSBURG.

Crucible Steel	13½	12¾	12⅞	4,118
Crucible Steel, Pref.	68⅞	66	67¼	2,275
Tonopah Ext.	6.00	6.00	6.00	150

COLORADO SPRINGS.

Name of Company.	First	High	Low	Clg.
Elkton	54¾	54¾	53	53
El Paso	74¾	74¾	65	66½
Isabella	28	28	28½	27½
Portland	220	224	215	215
Vindicator	75	77	75	77

SAN FRANCISCO.

Best & Belcher	1.10	1.10	1.10	1.10
Bullion	.37	.37	.37	.37
Caledonia	.43	.50	.43	.50
Confidence	.75	.76	.70	.76
Con. Cal. & Va	1.25	1.25	1.25	1.25
Gould & Curry	.20	.21	.19	.20
Hale & Norcross	1.00	1.00	1.00	1.00
Mexican	1.00	1.05	1.00	1.00
Occidental Con	.87	.87	.87	.87
Ophir	5.25	5.50	5.25	5.50
Savage	.50	.50	.48	.48

*Ex-dividend. †1st Instalment Paid.
‡Assessment Paid. §2d Installment Paid.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1904.	1905.	1904.	1905.
January	57.005	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	58.046	26.164	26.794
April	54.202	56.600	24.974	26.108
May	55.490	57.832	25.578	26.664
June	55.673	58.428	25.644	26.910
July	58.095	58.915	26.760	27.163
August	57.806	60.259	26.591	27.822
September	57.120	61.695	26.349	28.528
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are in cents per fine ounce; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	New York.				London.	
	Electrolytic.		Lake.			
	1904.	1905.	1904.	1905.	1904.	1905.
Jan.	12.410	15.008	12.553	15.128	57.500	68.262
Feb.	12.063	15.011	12.245	15.136	56.500	67.963
March	12.299	15.125	12.551	15.250	57.321	68.174
April	12.923	14.920	13.120	15.045	58.247	67.017
May	12.758	14.627	13.000	14.820	57.321	64.875
June	12.269	14.673	12.399	14.813	56.398	65.881
July	12.380	14.888	12.505	15.005	57.256	66.887
Aug.	12.343	15.664	12.468	15.725	56.952	69.830
Sept.	12.495	15.965	12.620	15.978	57.645	69.667
Oct.	12.993	.....	13.118	.....	60.012	.....
Nov.	14.284	.....	14.456	.....	65.085	.....
Dec.	14.661	.....	14.849	.....	66.384	.....
Year.	12.823	.....	12.990	.....	58.587	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	28.845	29.325	July	26.573	31 760
Feb.	28.087	29.262	August	27.012	32.866
Mar.	28.317	29.523	Sept.	27.780	32.095
April	28.132	30.525	Oct.	28.596	.....
May	27.718	30.049	Nov	29.185	.....
June	26.325	30.329	Dec.	29.286	.....
			Av., year.	27.986	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July	4.192	4.524
Feb.	4.375	4.450	Aug.	4.111	4.665
Mar.	4.475	4.470	Sept.	4.200	4.850
April	4.475	4.500	Oct.	4.200	.....
May	4.423	4.500	Nov.	4.200	.....
June.	4.496	4.500	Dec.	4.600	.....
			Av., year.	4.309	.....

Prices are in cents per pound.

SPELTER.

Month.	New York.		St. Louis.		L'nd'n
	1904.	1905.	1904.	1905.	1905.
January	4.863	6.190	4.673	6.032	25.063
February	4.916	6.139	4.717	5.989	24.594
March	5.057	6.067	4.841	5.917	23.825
April	5.219	5.817	5.038	5.667	23.813
May	5.031	5.434	4.853	5.284	23.594
June	4.760	5.190	4.596	5.040	23.875
July	4.873	5.396	4.723	5.247	23.938
August	4.866	5.706	4.716	5.556	24.675
September	5.046	5.887	4.896	5.737	26.375
October	5.181	.....	5.033	.....	.....
November	5.513	.....	5.363	.....	.....
December	5.872	.....	5.720	.....	.....
Year	5.100	.....	4.931	.....	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.